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Encyclopedia
of Substitutes and Synthetics

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of
Substitutes and Synthetics

Edited by

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Preface

The present war has focused attention upon the fact that this country is not as self-sufficient in its raw material requirements as many of us thought. As is well known many vital materials are practically impossible to obtain. This is so because of the fact that many of them are insufficiently stocked for the use of both our armed forces and for civilian economy. An attempt has been made in this book to indicate what may be used in place of these hard-to-get materials. The editor felt, however, that a mere listing of these substitutes would be insufficient. He has gone further and has compiled an encyclopedia in which he has listed the materials and in addition has presented some of the chemical and physical properties of the materials and products. In this way it is hoped that further uses may be found for many of the items listed.

The term "substitute" is a misnomer. The search for substitutes is actually the history of the development of industry. What is a substitute today may not be one tomorrow. In many cases it has been found that the substitute is superior to the materials it was supposed to replace. On the other hand, the substitute may be found to be inadequate for the purpose intended and dropped therefore, without further ado.

The subject matter of this type of book changes very rapidly. Every attempt has been made to include the most recent developments. However, due to the rapid technological advances as a result of the war certain omissions were unavoidable. The book should serve, however, as a good starting point in the hunt for replacement materials. The editor earnestly requests suggestions from the users of this volume. He would appreciate any additional information furnished him so that the book may be kept up-to-date by the issuance of additional supplements.

The editor wishes to take this opportunity to express his thanks to the many companies which furnished him with all the information he requested. He also wishes to thank Doctors Charles L. Marlies and D. D. Runes for their many helpful suggestions in the preparation of the text. To Miss Anne L. Lustig he is deeply grateful for her assistance in the compilation and in the typewriting of many of the articles.

THE EDITOR

NEW YORK CITY

Reference Books in this Series:

The Dictionary of Biochemistry

The Dictionary of Science and Technology

The Petroleum Encyclopedia

Twentieth Century Physics

Twentieth Century Engineering

The Chemistry of Synthetics

From Copernicus to Einstein

The Conquest of Bacteria

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A

ABALYN

Trade name for a liquid synthetic resin which is a mixture of several isomeric forms of abietic acid methyl esters.

Properties:

Formula $C_{19}H_{29}COOCH_3$
Refractive index 20°C.1.5297
Boiling range360-370°C.
Specific gravity1.033-1.043
Flash point (Open Cup)190°C.
Acid number5
Saponification number25
Viscosity 25°C.26 poises

Uses:

An extender for phenolic resins; non-drying inks; plasticizer in nitrocellulose lacquers.

ABELMOSCHUS (Amber seed, Musk mellow, Musk okra, Musk seed)

Seeds of *Abelmoschus* found in Egypt, India and tropical America.

Uses:

Substitute for musk in making perfumes.

ABIETIC ACID (Abietinic Acid)

A yellowish powder. It is a naval stores product which is the active ingredient of rosin. This acid is obtained when colophony is digested with weak alcohol.

Properties:

Melting point182°C.

Solubility:

Very soluble in alcohol and ether.

Soluble in benzene, glacial acetic acid, carbon bisulfide.

Insoluble in water.

Uses:

In the manufacture of soaps.

Varnish driers, fermentation promoter.

Substitutes:

Liqro

ABIETINIC ACID

See Abietic Acid.

ABOPON

Trade name for a water-white viscous synthetic resin. Sodium borophosphate complex.

Properties:

Specific gravity (25°)1.68

pH (90% solution)6.65

(1% solution)8.00

ACACIA GUM

Solubility:

Watercompletely soluble
Alcoholinsoluble
Hydrocarbonsinsoluble
Oilsinsoluble

Uses:

In adhesives where high alkalinity is undesirable, to replace silicates.

In finger-waving solutions to replace gums.

ACACIA GUM

See Arabic Gum.

ACAROID (Accroides Gum, Black-boy gum, Xanthorrhoea gum)

A natural resin obtained from the Xanthorrhoea tree found in Australia.

Solubility:

Soluble in alcohol.

Uses:

Substitute for rosin in paper sizing and in the manufacture of sealing wax. Is frequently used as a spirit varnish in which case it is inferior to shellac.

ACCOTEX

Trade name for a material developed to replace leather for certain uses. It is claimed to be made of a non-oxidizing and highly-resistant compound developed specifically for textile manufacturing.

ACCROIDES GUM

See Acaroid.

ACETAL DE HYDE

ACELOID FLAKES

Trade name for a cellulose nitrate product. It is reclaimed from selected films and is completely soluble in all known nitrocellulose solvents. It comes in small flake form wet down with an alcohol solution for safety.

It is used wherever nitrocellulose is applicable.

ACEPLUS FLAKES

Trade name for a cellulose acetate product reclaimed from selected film. It is completely soluble in all known cellulose acetate solvents and diluents. The material is in small flake form.

It is used in all requirements where cellulose acetate is applicable.

ACETALDEHYDE (Acetic Aldehyde, Acetyl Hydride, Ethanal, Ethyl Aldehyde) CH_3CHO

A colorless liquid which is inflammable. It possesses a pungent, fruity odor.

Properties:

Specific gravity0.7827 (20°C.)
Boiling point20.8°C.
Melting point-123.5°C.
Refractive index1.3316 (20°C.)
Specific heat0.650

Solubility:

Miscible with water, and most organic solvents.

ACETAMIDE

Uses:

Chemical synthesis, dyes, synthetic rubber, resins, plastics, photography, perfumes, etc.

Substitutes:

Paraldehyde.

ACETAMIDE

(Acetic Acid Amine) CH_3CONH_2

Colorless deliquescent crystals. It possesses a characteristic odor.

Properties:

Specific gravity	1.139
Melting point	85°C .
Boiling point.....	223°C .
Refractive index	1.4274

Solubility:

Soluble in water and alcohol.

Uses:

In the preparation of methyl amine.

In the preparation of methyl cyanide.

As a stabilizer for hydrogen peroxide solutions.

Solvent, hygroscopic agent, wetting agent, penetrating agent.

It is used in the manufacture of lacquers and explosives.

Substitutes:

Formamide may be used as a substitute in the preparation of methyl amine.

ACETONE

Ammonium acetate may replace acetamide in the preparation of methyl cyanide.

Urea is an excellent stabilizer for hydrogen peroxide solutions.

ACETIC ACID (Methanecarboxylic acid, Vinegar acid) CH_3COOH .

Used in the dyeing of wool and other processes. It may be replaced by solutions of ammonium sulfate and sulfuric acid, lactic acid or formic acid.

ACETIC ACID AMINE

See Acetamide

ACETIC ALDEHYDE

See Acetaldehyde.

ACETO BUTYRATE TUBING

Claimed to be extruded out of a special formulation of Tennessee Eastman Tenite II plastic. It is used to replace copper tubing in many applications. It is flexible and transparent.

ACETONE CH_3COCH_3

A fragrant liquid with a mint-like odor. It is colorless.

Properties:

Boiling point	56.48°C .
Melting point	-94.3°C .
Refractive index	1.3591 (20°C .)
Specific gravity	0.7972 (15°C .)

ACETYL HYDRIDE

Solubility:

Soluble in water, alcohol, ether, chloroform, volatile oils.

Uses:

As a general solvent.

Substitute for alkalis in photographic developers.

Absorbent for acetylene gas.

Substitutes:

Ethyl formate.

ACETYL HYDRIDE

See Acetaldehyde.

ACETYLENE C_2H_2

A colorless gas which is highly inflammable. It possesses an ethereal odor. It is obtained as a product of the reaction between water and calcium carbide.

Properties:

Specific gravity0.91
Boiling point-83.6°C.
Melting point-8.15°C.

Solubility:

Soluble in water, alcohol and acetone.

Uses:

Substitute for butane as a fuel in internal combustion engines.

It is also used in the manufacture of dyes, explosives, synthetic rubber, tannins, and resins. Other uses include: enricher for illuminating gas, water gas, etc.

ACRAWAX

In the welding and cutting of metals acetylene has found great use.

Substitutes:

Propane may be used in place of acetylene in the steel industry.

ACETYLENE-GENERATOR WASTE (Calcium carbide residue; Carbide of lime)

This is used as a cheaper substitute for the lime element in interior and exterior plasters.

ACRAWAX

Trade name for a modified fatty acid ester, which is a hard, light brown wax with a high luster.

Properties:

Melting point95-97°C.
Specific gravity (24°C)1.04
Flash point230°C. (open cup)

Solubility:

Soluble (hot) in alcohol, toluol, butyl acetate, turpentine.

Insoluble in water and mineral spirits.

Uses:

Blends with rosin, shellac, carnauba wax, stearic acid, ester gum.

It is not compatible with paraffin and other mineral waxes.

Claimed to be a substitute for carnauba and similar waxes.

ACRAWAX B

ACRAWAX B.

Trade name for a product claimed to be a modified fatty acid ester. It is a hard, light brown wax with a good luster.

Properties:

Melting point	81-84°C.
Specific gravity (25°C.)	0.955
Flash point	235°C. (open cup)

Solubility:

Insoluble in water.

Soluble (hot) in mineral spirits, alcohol, toluol, butyl acetate, mineral oil.

Uses:

This wax differs from acrawax in the fact that it is compatible with paraffin wax and forms gels with mineral spirits and kerosene.

It is claimed that the latter property makes it useful as a flatting agent for paints. It can be used to replace aluminum stearate and other metallic soaps and carnauba wax for this purpose. This gives increased compactness of material.

ACRAWAX C.

Trade name for a synthetic wax said to be similar to acrawax except that it blends with paraffin wax, carnauba wax, rosin, etc.

Properties:

Color and form.....	hard, brown wax
Luster	high
Melting point	137-139°C.
Specific gravity.....	0.975 (25°C.)
Flash point	285°C. (open cup)

Solubility:

Insoluble in water.

Completely soluble (hot) in toluol, mineral spirits, turpentine.

Uses:

It can be used where high melting wax which is not brittle is desirable. Because of its high flash point it can be used in place of other waxes which are un-

desirable due to fire hazards.

ACROLITE

A synthetic plastic produced by condensing phenol and glycerol or its homologues.

ACRYLONITRILE

(Propene Nitrile) $\text{CH}_2=\text{CHCN}$

A colorless, inflammable liquid.

Properties:

Boiling point	-77°C.
Melting point	-83 to -84°C.

Solubility:

Partly soluble in water.

Soluble in all the common organic solvents.

Uses:

In the manufacture of synthetic rubber.

It is also used in the manufacture of plastics and in organic synthesis.

Substitutes:

Styrene has been found to be an excellent substitute for this product in the manufacture of synthetic rubber.

ACRYLIC RESINS

Synthetic resins obtained from the polymerization of acrylic acid and methacrylic acid. They are available in a number of grades.

Properties:

These resins are characterized by their water-white color, perfect transparency and resistance to discoloration. Most of them are resistant to acids, alcohol, water, mineral oils and alkalis. They are all thermoplastic.

Solubility:

Soluble in aromatic hydrocarbons, chlorinated hydrocarbons, esters and ketones.

Uses:

In protective coatings.

ACTIVATED ALUMINA

Trade name for a form of aluminum oxide which is claimed to be highly porous and granular. It is said to have excellent adsorptive capacity for moisture from vapors, gases and some liquids. When saturated the moisture can be driven off by the application of heat and the material is revived or reactivated.

Chemically it is inert to most gases and vapors. It is non-toxic.

Uses:

Claimed to be more stable than silica gel.

ACTIVATED CARBON**(Activated Charcoal)**

A pure form of carbon possessing a high degree of absorptive capacity.

Uses:

As a clarifier.

Substitutes:

Albumen, alum, aluminum sulfate, bentonite, boneblack, casein, clay, diatomaceous earth, fossilite, fullers earth, gelatin, infusorial earth, irish moss, isinglass, kieselguhr, magnesium carbonate, magnesium oxide, monocalcium phosphate, paper pulp, silica, talc, zinc sulfate.

A new method for the production of an activated carbon has recently been developed. This method produces a carbon which is claimed to be superior in many respects to other currently manufactured activated carbons.

ACTIVATED CHARCOAL

See Activated carbon.

ADAGANTHIN

See Bassorin.

ADAMANTA

A substitute for rubber claimed to be prepared from resin, lime and linseed oil.

ADEPS

See Lard.

ADHESO WAX

Trade name for a terpene-modified hydrocarbon.

It is a white, waxy solid, forming a viscous gel when melted. It is about as hard as beeswax.

Properties:

Melting point90-95°C.

Softening point0795

Solubility:

Soluble in hot toluol, mineral spirits, mineral oil.

Insoluble in water.

When heated with some oils and waxes it turns transparent above 120°C.

ADOPON

Uses:

It is suggested for use where its high water and electrical resistance is applicable.

ADOPON

Trade name for a water white liquid which is a sodium boro-phosphate complex.

Solubility:

Soluble in water, diethylene glycol, glycerin.

Insoluble in toluol, methyl alcohol, ethyl alcohol, vegetable oil, mineral oils, mineral spirits.

Properties:

Specific gravity1.68(25°C.)

Uses:

To replace gums in finger-waving solutions.

As a binder for other insulating materials.

ADRAGANTHIN

See Bassorin.

ADVAGUM

A terpene plasticized polymer. A synthetic rubber-like plastic used in the compounding of synthetic rubbers to improve processing qualities, increase tear resistance, decrease swelling, improve aging and lower volume costs of vulcanized products. Claimed to be non-tacky, mild, possessing a pleasant odor.

Specific gravity1.1 (25°C.)

AGAR AGAR

AEROTEX RESINS

Trade name for a series of synthetic resins of the urea-formaldehyde type.

They are used primarily in the finishing of textile fabrics.

AGALMATOLITE

See Pyrophyllite.

AGAR-AGAR (Bengal, Ceylon, Chinese or Japanese Isinglass or Gelatin; Macassargum; Lavar Caranga)

A dried mucilaginous vegetable gelatin extracted from various algae in the Pacific and Indian Oceans. When unground it comes in thin translucent pieces; when ground it is a pale, buff powder.

It is soluble in hot water.

Uses:

It serves as a substitute for gelatin in adhesives.

It is also useful to replace the white of egg in food products.

Recently several types of algaous materials flourishing along the Southeastern coast of the United States and Puerto Rico have been discovered.

From these there has been obtained a satisfactory agar-producing material.

Substitutes:

Sodium alginate.

Gomagel

AGATE

A form of silica or quartz of various colors depending upon the impurities present.

Uses:

In the manufacture of costume jewelry, mortars and pestles, textile rollers, pivot supports for balances and compass needles, etc.

Substitutes:

Polished cyanided steel.

AGRIPOL

A form of bred synthetic rubber made mainly from soybeans and ethyl alcohol. Claimed to be a rubber for mechanical goods installations such as those which employ Thikol and Neoprene. It is not applicable to tire use.

Its tensile strength and its resistance to severe abrasion are not as pronounced as in natural rubber but it is said to be as flexible as natural rubber at temperatures as low as -40°F. It is claimed to be superior to natural rubber in aging qualities and in resistance to oxidation and to the elements. Its vulcanizing temperature is about the same as that of natural rubber and it can be worked on existing rolls and formed in existing molding equipment.

It is available in many forms, such as sponge rubber, latex or a solid capable of extrusion into molds.

AKERITE

Trade name for a glycerin alternative. It is said to be an aqueous non-toxic liquid which is derived from corn.

It is soluble in alcohol(water and glycerin. Insoluble in petroleum solvents. It attracts water during storage and has a low freezing point.

ALBACER

Trade name for a synthetic wax which is a fatty acid ester. It is white, hard and possesses a high luster.

Properties:

Melting point95-96°C.

Specific gravity0.968 (25°C.)

Saponification value180-185

Solubility:

Insoluble in water, ethyl alcohol, methyl alcohol.

Soluble (hot) in naphtha, turpentine, toluol, mineral oil, vegetable oil, carbon tetrachloride, butyl acetate.

Uses:

It is compatible with other waxes, vegetable oils, mineral oils, synthetic resins.

ALBAOIL

Trade name for sulfonated castor oil.

Properties:

pH6.0-6.7

ALBERTOL RESINS

Solubility:

Soluble in water.

Emulsifies in water.

Uses:

Textile manufacture.

Leather manufacture.

ALBERTOL RESINS

Trade name for a series of phenolic resins. They may be modified into three groups.

1. Modified Phenolic Resins. These are soluble in oil and spirits. They are available in various colors and various hardnesses. Useful in varnishes, enamel media, printing inks, etc.

2. Spirit-soluble Pure Phenolic Resins and Thermo-hardening Types. The films produced by these resins are very hard. Because they are so brittle plasticizers are required. The films are resistant to fatty and mineral oils.

These resins are useful in aniline inks, spirit varnishes, stoving lacquers, etc.

3. Inert Hydrocarbon Resins. These are soluble in mineral spirits and other hydrocarbons. They are insoluble in alcohols and lower esters.

Useful in the production of anti-corrosive films and coatings. These coatings have a high resistance to heat or electricity.

ALBOLENE

See Petrolatum, Liquid.

ALBUSOL

ALBUMIN, BLOOD

Natural material obtained from serum drained from ox-blood.

It is available in brown, amorphous lumps.

It is soluble in water and alcohol.

Uses:

In textile printing.

It has recently been discovered that special thermosetting synthetic resin plastics can replace albumin in textile processing.

ALBUMIN, EGG

White of egg which is separated from the yolk. It is available on the market both in the liquid and solid state.

On heating it coagulates and in this process it carries down any coloring matter and impurities present. Because of this property it may be used as a clarifying agent. In addition it is used in the leather industry, in sizings, adhesives, textile printing, photography, etc.

Because of the property of clarifying solutions it may be used as a substitute for activated carbon.

Substitutes:

Agar-agar in food products.

Casein in various compositions.

ALBUSOL

Trade name for a solution of egg albumin which is used to replace dry albumin or egg in the graphic arts.

ALCOHOL

See Ansol M.

ALCOHOL, DENATURED

There are two kinds of denatured alcohol, the completely denatured and the specially denatured alcohol. Ethyl alcohol which has been made unfit for beverage purposes is the former and the latter is ethyl alcohol which had been denatured so that it may be used in a greater number of industries and arts.

Shellacol may be used as a substitute for both types of denatured alcohol.

ALDEHYDE RESIN

A resin made by treating an aldehyde with caustic soda or other condensing agents.

ALEPPO GALLS

See Galls.

ALGINIC ACID

See Sodium Alginate.

ALKYD RESINS

These resins are sometimes referred to as hydroxy-carboxylic resins. The term

"alkyd" is preferred however. It was coined from "alkyl" and "acid". They are produced by the condensation of polyhydric alcohols with polybasic acids. As a rule trihydric alcohols such as glycerol and dibasic acids such as phthalic or maleic acids have generally been used in the preparation of alkyd resins which are suitable for use in surface coatings.

These products are replacing the fast-drying oils, and finishes prepared with them are being used for architectural and mill-white enamels, marine paints, and finishes for automobiles, refrigerators, furniture, toys, etc.

Alkyd resin emulsion paints are being used as substitutes for the oil-varnish types of paints. It is claimed that their rapid-drying qualities make them suitable for interior wall paints and exterior paints for cinderblock, concrete, cement and similar surfaces.

Alkyd resins in varnishes are being replaced with maleic resins and celesterol. In rapid-drying enamels combinations of hard natural resins and specially processed oils are taking their place. Piccolyte resins (terpene polymers) with dehydrated castor oil are replacing them in non-yellowing white enamels.

ALMOND OIL (Sweet Oil, Bland Oil)

There are two types, sweet and bitter, both of which are obtained from the seed of *Amygdalus communis*. A yellowish liquid with an aromatic odor.

Properties:

Sweet	Bitter
Specific gravity	
0.915-0.920	1.045-1.060

Melting point	
13-14°C.	13-14°C.
Boiling point	
	180°C.
Saponification value	189-200
Iodine number	93-104

Solubility:

Sweet: Soluble in alcohol, ether, chloroform, benzene.

Bitter: Soluble in water, ether.

Insoluble in alcohol.

Uses:

Manufacture of soaps, perfumes, cosmetics, lubricant, flavoring agent, food preparation. It is also used as a lubricant for delicate machinery.

Substitutes:

Dwarf almond fatty oil.

Benzaldehyde may be used as a substitute for oil of bitter almond in food products.

Peach kernel oil is a nutrient similar to almond oil.

Refined mineral oil may be used in place of almond oil as a lubricant.

ALPHA PROTEIN

A soybean protein possessing the general characteristics of milk casein. It is used in the manufacture of casein paint, kalsomine and other cold water paints.

ALPROKYD RESINS

Trade name for synthetic rubber proalkyd resins. They are either drying or non-drying and are used for baking and air-drying finishes, printing inks, etc.

These resins are available in a number of types.

ALRESATES

Trade name for a series of maleic resins which are soluble in drying oils and N.C. lacquer solvents. They are available in a number of types, varying in hardness and in the ease with which it is dissolved in oils.

Uses:

In the manufacture of pale non-yellowing oil varnishes.

In the preparation of printing ink media and in N.C. lacquers.

ALSIFILM

Trade name for a material which may be considered a substitute for mica. It is prepared from the bentonite clays found in the Western part of the United States. These clays consist mainly of aluminum silicate and magnesium silicate and hence this material is completely inert to oils, greases and organic solvents. It possesses notable dielectric properties. This substance can be made into very thin, translucent, flexible sheets which may be dyed or colored. It may also be compounded with various fibrous materials so as to obtain sheets of greater strength.

Uses:

As a substitute for mica.

ALUM

See Aluminum sulfate.

ALUMINUM

Aluminum is a ductile, silvery metal which is obtained by means of the electrolysis of aluminum oxide dissolved in molten cryolite.

Properties:

Specific gravity2.708

Melting point660°C.

Solubility:

Soluble in concentrated acids and alkalies.

Insoluble in water.

Uses:

A great many uses have been found for aluminum. Its most popular use is in the construction of airplanes and other constructional articles where its light weight would be a factor. Since much of the bauxite used for the extraction of aluminum was formerly imported from Guiana the importance of finding substitutes can readily be realized.

The extraction of aluminum from its ores requires enormous amounts of electricity. This great difficulty has been partly overcome by the construction of dams along the Columbia and Tennessee Rivers where the new plants are being located.

Magnesium has been shown to be an excellent substitute for aluminum. It is lighter and easily worked. But here again we come up against the problem of shortages in the substitute material. As a matter of fact the same may be said of all metallic substitutes for aluminum. We must therefore, turn to other materials. Plastics and laminated plywoods are rapidly assuming great importance in certain parts of airplanes and in other articles to replace aluminum.

Plastics are replacing aluminum as agitators for washing machines. It has been reported that these agitators are easier on the clothes, lighter and that they possess a longer life. Plastics are also being used in the construction of refrigerators, vacuum cleaners, airplane parts, kitchen utensils, radios and radio parts, pattern plates, lithographic plates, in fuses for trench mortars, in the use of alloys, and in a great number of common ordinary everyday uses.

Zinc may be used to replace aluminum in die-casting shapes.

Glass is another material which is finding great use as a substitute for this metal. As a heat-insulating material glass fiberboard has recently been introduced. Kitchenware, recording disks, etc. are all finding uses for glass.

An important substitute for aluminum is enamelware. The enamel products now available are highly resistant to food acids, and coatings of lesser thicknesses are produced by the new methods of processing. This tends to reduce the ability to chip. Enamel steel may be used in refrigerator parts, in stoves, in washing

ALUMINUM CHLORIDE

machines, kitchenware, in radios and radio parts, etc.

Aluminum paint is being replaced by a special aluminum colored paint which closely approximates the color of aluminum.

Cast iron is a substitute for aluminum in certain automobile parts, aluminum castings, aluminum forged die cast, arc welders.

Among other substitutes for aluminum may be mention the following: oiled paper for aluminum foil; lead foil, tin foil, glassine, for the same purpose; plastic bound plywood, enameled porcelain, copper, china, chromium-plated steel, vulcanized rubber, wood, brass, tinned copper, cadmium plating, chrome electro copper and tin.

ALUMINUM CHLORIDE

Yellow to greenish crystals.

Properties:

Melting point 190°C.

Boiling point 182°C.

Solubility:

Soluble in water, alcohol and ether.

Uses:

Polymerizing agent for unsaturated hydrocarbons.

Substitutes:

Diethyl acid-phosphate.

ALUMINUM OLEATE

Alkyl acid phosphates.

Aluminum acetate may be used in the preparation of acetaldehyde and acetic acid from ethyl alcohol in place of aluminum chloride. According to the same patent alcohols from aliphatic hydrocarbons may also be prepared using either aluminum acetate or aluminum chloride.

ALUMINUM FLAKE

See Aluminum Powder.

ALUMINUM OLEATE

White-yellowish substance. It is obtained when aluminum hydroxide, water and oleic acid are heated together. The mixture which is obtained is then filtered and dried.

Solubility:

Insoluble in water.

Uses:

Waterproofing of materials.

Lubricating oils thickener.

A drier for paints.

Substitutes:

In the waterproofing of materials it is possible to use calcium resinate and calcium stearate as substitutes.

As driers for paints the following have been suggested as substitutes: Lead oleate, lead resinate, lead stearate, magnesium oleate, zinc oleate, and zinc stearate.

ALUMINUM POWDER

ALUMINUM POWDER (Aluminum Flake)

A powdered form of aluminum.

Properties:

Specific gravity2.7

Melting point700°C.

Solubility:

Soluble in acids and alkalies.

Insoluble in water.

Uses:

In the manufacture of paints and varnishes.

Substitutes:

Aluminum silicate, fullersite, slate flour, lead powder, mica, muscovite, pearl essence, potassium-aluminum silicate, synthetic resins, ferrichrom-glucosate.

ALUMINUM RESINATE

A dark brown mass which is obtained when aluminum hydroxide and rosin are heated.

Solubility:

Insoluble in water.

Uses:

Substitute for calcium resinate in the manufacture of paint driers.

ALUMINUM STEARATE

ALUMINUM SILICATE $Al_2(SiO_3)_3$

A white amorphous mass.

Solubility:

Insoluble in water and acids.

Uses:

A substitute for aluminum powder in the manufacture of priming-coat paints.

ALUMINUM STEARATE

White to yellowish amorphous powder.

Solubility:

Soluble in turpentine oil, petroleum, alkalies.

Slightly soluble in alcohol.

Insoluble in water.

Uses:

Flattening agent in paints.

Waterproofing, lubricants.

Substitutes:

Acrawax B.

Stroba wax.

Aluminum oleate, calcium resinate, calcium stearate, lead resinate.

ALUMINUM SULFATE

ALVAR

ALUMINUM SULFATE (Alum; Pearl
alum; Pickle alum) $\text{Al}_2(\text{SO}_4)_3$

minum oxide. The less pure grades are said to contain small amounts of iron oxide, titanium oxide and silica.

White crystalline substance.

Properties:

Specific gravity2.71

Melting point
decomposes at 770°C.

Solubility:

Soluble in water; insoluble in alcohol.

Uses:

Clarifying agent as a substitute for activated carbon.

In the manufacture of paper.

In the coagulation of water.

In textile sizing.

Substitutes:

It has been found that ferric sulfate may be substituted for aluminum sulfate in the manufacture of certain grades of paper. It may also be used instead of aluminum sulfate in the coagulation of water.

Sulfuric acid may substitute for aluminum sulfate in the sizing process.

ALUNDUM

Trade name for a series of electrically fused alumina products which may be used both as refractory materials or abrasives. The product is available in various degrees of purity. It is claimed that the purest form contains more than 99% alu-

Properties:

Specific gravity3.9-4.0

Fusion point2000-2050°C.

Uses:

Filtering strong acids.

Electrical constructions.

Protection of metallic resistors from corrosion.

Alundum refractory cores may be used for the construction of wire-resistance electric furnaces.

ALVAR

Trade name for a synthetic resin of the polyvinyl acetal type. It is slightly yellow in color.

Solubility:

Soluble in lacquer solvents and aromatic hydrocarbons.

Insoluble in aliphatic hydrocarbons.

Uses:

In the manufacture of spirit varnishes, enamels, lacquers, cements, adhesives. It may also be used in phonograph records.

AMBER

AMERIPOL

AMBER (Fossil Resin)

A pale yellow, grading to brown or reddish-brown fossil resin obtained from an extinct variety of pine. It is translucent, takes a high polish and becomes strongly electric by friction. It is little used today because of its high price and scarcity. Copal is frequently used instead of amber for the same purpose in beads, ornaments, mouthpieces for pipes and cigarette holders, varnish, etc.

AMBER SEED

See *Abelmoschus*.

AMBERLAC RESINS

Trade name for a series of synthetic resins which are of the maleic glyceride and alkyd type. They are marketed in a number of grades.

Uses:

In the manufacture of paints, varnishes and lacquers.

AMBERLITE

A phenol-formaldehyde resinous product used in the manufacture of plywood adhesives and in ion exchange resins.

AMBEROL RESINS

Trade name for a series of phenol-formaldehyde resins dispersed in ester gums. These are all oil soluble resins.

Amberol resins are used mainly for paints, varnishes and lacquers.

AMBRAC

Trade name for a corrosion-resisting copper-nickel-zinc alloy. This alloy contains 75% copper, 20% nickel and 5% zinc. It is resistant to both hot and cold sulfuric acid in the absence of oxidizing agents. Under certain conditions it resists the attack of hydrochloric acid. In the absence of air it is resistant to acetic acid, sodium hydroxide, sea water, and chlorine in aqueous solution. It is fairly resistant to moist sulfurous atmospheres.

AMBROX

Trade name for a creamy white material which consists of the following substances:

ZrO ₂	82.3%
TiO ₂	3.3%
SiO ₂	9.7%
Na ₂ O	1.7%

Its specific gravity is 5.34.

Uses:

Opacifier for enamels and glazes. This product is similar to Opax.

AMERIPOL

Trade name for synthetic rubber products manufactured from Hycar. This material is a butadiene copolymer.

AMEROID

Properties:

Vulcanizable. Claimed that products manufactured from this are resistant to oils, aging, abrasion, heat, flame.

Uses:

Tires, oil resisting hose, printing rubbers, printing rollers, oil-proof fabrics, automotive parts, oil resisting asbestos sheet packing.

AMEROID

Trade name for a non-inflammable casein composition which is available in the form of fully cured and hardened sheets, round rods, discs, and flat, punched shapes. This material is not a molding composition.

AMINOBENZENE

See Aniline.

AMINOFORM

See Hexamine.

AMMONIOFORMALDEHYDE

See Hexamine.

AMMONIUM ACETATE $\text{NH}_4(\text{C}_2\text{H}_3\text{O}_2)$

A hygroscopic, white crystalline powder with an acetic acid odor. It is obtained

AMMONIUM BICARBONATE

when glacial acetic acid is reacted with ammonia gas.

Properties:

Specific gravity1.073

Melting point89°C.

Solubility:

Soluble in water and alcohol.

Uses:

Substitute for acetamide in the preparation of methyl cyanide. It is also used in analytical chemistry and in the drug, textile and dyeing industries.

AMMONIUM BICARBONATE NH_4HCO_3

White crystalline substance.

Properties:

Specific gravity1.586

Melting point
decomposes at 36-60°C.

Molecular weight77.03

Solubility:

Soluble in water; insoluble in alcohol.

Uses:

Substitute for yeast in baking.

It is also used in the manufacture of ammonium salts, in the manufacture of dyes, in fire-extinguishing compounds and

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Melting point89°C.

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White crystalline substance.

Properties:

Specific gravity1.586

Melting point
decomposes at 36-60°C.

Molecular weight77.03

Solubility:

Soluble in water; insoluble in alcohol.

Uses:

Substitute for yeast in baking.

It is also used in the manufacture of ammonium salts, in the manufacture of dyes, in fire-extinguishing compounds and

AMMONIUM CARBONATE

as an ingredient of textile degreasing compounds.

Substitutes:

Sodium bicarbonate is used as a substitute in baking powders and in fire extinguishing compounds.

Ammonium carbonate is also useful as a substitute for ammonium bicarbonate in many of its uses such as in baking powders, fire extinguisher fluids, etc.

AMMONIUM CARBONATE

When ammonium salts are heated with calcium carbonate this colorless powder is obtained which is unstable in air. It is rapidly converted to the bicarbonate.

Properties:

Melting point85°C.

Solubility:

Soluble in cold water.

In hot water it decomposes forming ammonia and carbon dioxide.

Uses:

As a substitute for ammonium bicarbonate in many of its uses. It is also used in the production of ammonium salts, in the rubber industry as an ingredient of rubber batches, as an ingredient of casein colors, as an ingredient of smokeless powders, as an ingredient of casein glues and adhesives, in tanning compositions, cosmetics, smelling salts, etc.

AMMONIUM PHOSPHATE

AMMONIUM META-VANADATE



White crystalline powder.

Properties:

Specific gravity2.326

Melting point
decomposes at 210°C.

Solubility:

Slightly soluble in cold water.

Insoluble in saturated ammonium chloride solution.

Uses:

Raw material for the preparation of catalysts which are being used to replace the more expensive ones used in the manufacture of sulfuric acid and other chemical products.

AMMONIUM PHOSPHATE

There are three types of ammonium phosphate, (a) dibasic, (b) hemibasic and (c) monobasic. They are all white crystalline powders. (a) is slightly alkaline in reaction. (b) and (c) are slightly acid in reaction.

Properties:

Specific gravity 1.619.....1.803

Solubility:

Water	^a soluble	^b soluble	^c moderately soluble
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AMMONIUM STEARATE

Uses:

The a and c form may be used as substitutes for ammonium sulfate as fertilizers, in fireproofing compositions, in the impregnation of candlewicks and in the manufacture of baking powders.

The b form is used as a nutrient for gardens and as a yeast food.

AMMONIUM STEARATE, ANHYDROUS

Tan, wax-like material. Odorless.

Properties:

Melting point73-75°C.

Specific gravity (22°C).....0.89

pH (5% aqueous dispersion)
7-5-7.7 (25°C.)

Solubility:

Completely soluble (hot) in alcohol, hydrocarbons and oils.

Dispersible (hot) in water.

Uses:

Emulsifying and thickening agent for the manufacture of vanishing creams and brushless shaving creams. It replaces sodium and potassium stearates where high alkalinity is undesirable.

AMMONIUM STEARATE, PASTE

Pearly white soft paste with an ammoniacal odor.

AMMONIUM SULFAMATE

Properties:

Specific gravity0.96 (25°C.)

pH (5% aqueous dispersion)
9-5-9.7 (25°C.)

Neutralization value64-70

Solubility:

Completely soluble in alcohol.

Dispersible in water.

Emulsifies in hydrocarbons and oils.

Uses:

Water repellant coating for paper, textiles, etc.

Waterproofing agent for building materials.

Claimed that replacing stearic acid with this material tends to prevent the dry material from flying off in mixing.

AMMONIUM SULFAMATE NH_4SO_3 NH_2

A crystalline solid which is white in color.

Properties:

Melting point131°C.

Solubility:

Soluble in water.

Its aqueous solution is stable on boiling.

Uses:

Flameproofing fabrics, paper and other cellulose materials.

AMMONIUM SULFATE

It is claimed that this product does not cause stiffening or affect the feel and handle of the material treated.

AMMONIUM SULFATE $(\text{NH}_4)_2\text{SO}_4$

The color of this compound varies according to the degree of purity from brownish-gray to white. There are several methods for obtaining this material. One method is by the destructive distillation of coal. If the ammoniacal vapors are conducted into sulfuric acid and then crystallized and dried, ammonium sulfate of commerce is obtained.

Properties:

Specific gravity1.77

Melting point140°C.

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

It is used as an ingredient of battery charges, as a fertilizer, in the impregnation of candle wicks, in soldering liquids and as a reagent in galvanizing iron. It has also been found useful as an ingredient of fireproofing compositions.

It has been suggested that tartaric acid and cream of tartar may be replaced by ammonium sulfate in the manufacture of baking powders.

Substitutes:

Ammonium phosphate has been found to be a substitute for ammonium sulfate in many of its uses. Among these may be

AMYL ALCOHOL

included the following: fertilizer, fireproofing compositions, impregnation of candlewicks, in the manufacture of baking powders.

AMMONIUM SULFOCYANATE (Ammonium Thiocyanate) NH_4SCN

Colorless crystals which are obtained by boiling aqueous solutions of ammonium cyanide with sulfur or polysulfides. These crystals are deliquescent.

Properties:

Specific gravity1.3057

Melting point159°C.

Solubility:

Soluble in water and alcohol.

Uses:

Ingredient of match-head compositions.

Ingredient of weed-killers.

Ingredient of freezing solutions.

In textile dyeing.

Substitutes:

Sodium chlorate.

AMMONIUM THIOCYANATE

See Ammonium Sulfocyanate.

AMYL ALCOHOL, NORMAL

See Fusel Oil

AMYL FORMATE

AMYL FORMATE $\text{HCOOC}_5\text{H}_{11}$

An anhydrous colorless liquid. It is made up of a mixture of the isomeric forms of amyl formate, the isoamyl formate in predominance. Its odor is not as noticeable as that of amyl acetate and its solvent action is more energetic. Its boiling point is lower and its speed of evaporation is greater.

Properties:

Molecular weight	116.10
Specific gravity	0.880-0.885
Boiling point	130.4°C.
Flash point	80°C.

Solubility:

Slightly soluble in water.

Miscible with oils, hydrocarbons, alcohols, ketones.

Uses:

Solvent for cellulose esters, resins.

In solvent mixtures.

In the manufacture of films and coatings.

In the manufacture of celluloid substitutes.

AMYLASE

See Diastase, Malt.

ANHYDREX AA-60

Trade name for a special insulating material for use in submarine cables as a

ANILINE

substitute for gutta percha. It contains 60% deproteinized rubber.

It is claimed that its aging properties are excellent and adequate enough for all uses where water absorption is a factor.

ANHYDREX AA-LL

Trade name for a special insulating material for use in wires and cables. It contains 60% deproteinized rubber.

It is claimed that it has high heat resistance, extremely low water absorption, long life, and high dielectric strength.

It is used primarily in underwater cables.

ANILINE (Aniline Oil, Phenyl amine, Aminobenzene) $\text{C}_6\text{H}_5\text{NH}_2$

A colorless oily liquid which rapidly becomes brown on exposure to air and light. It is poisonous.

Properties:

Molecular weight	93.06
Specific gravity	1.0235
Melting point	-5.96°C.
Boiling point	184.4°C.

Solubility:

Slightly soluble in water.

Soluble in alcohol and ether.

Uses:

In the manufacture of dyes.

In dyeing and calico printing.
As a vulcanization acceleration.
In the manufacture of paint and varnish.

Properties:

Specific gravity
0.980-0.990 (20°C.)
Refractive index1.557-1.559

Substitutes:

It has been found that orthoaminodiphenyl, technical grade, can be used as a substitute for aniline in its various applications.

Solubility:

Soluble in alcohol.

Uses:

In perfumery.

ANILINE OIL

See Aniline.

Substitutes:

Anol.

ANIMAL BLACK

See Boneblack.

ANISEED OIL

See Anise Oil.

ANIMAL CHARCOAL

See Boneblack.

ANISE-SEED OIL

See Anise Oil.

ANIME

See Copal.

ANSOL M

Trade name for a product which is claimed to be anhydrous denatured alcohol with small amounts of ester and hydrocarbons added. It is water-white in color and inflammable.

ANISE OIL (Anise-seed Oil, Illicium Oil, Aniseed Oil)

Colorless, thick liquid. It solidifies to a crystalline mass at about 15°C. It consists of anethole, methylchavicol, anise ketone, and acetaldehyde. It posses a characteristic odor and a very sweet taste.

Properties:

Specific gravity..0.796-0.800 (20°C.)
Flash Point52°F. (approx.)

ANTIMONELLE

Solubility:

Slightly soluble in water.

Miscible with gasoline.

Uses:

Solvent for many resins which are insoluble in regular alcohol.

Substitute for high-boiling solvents.

Substitute for alcohol.

ANTIMONELLE

Trade name for a substitute for tartar emetic as a fixative for basic colors.

ANTIMONIAL LEAD

An alloy consisting of 15 parts of antimony and 85 parts of lead.

Properties:

Specific gravity10.4

Thermal expansion
coefficient19.5

Melting point230°C.

Uses:

Construction material of storage battery plates.

Stopcocks for sulfuric acid.

Substitutes:

Alloy consisting of 99.9 parts of lead and 0.1 part of calcium.

ANTIMONY LACTATE

ANTIMONY Sb

A grayish metal which is sometimes found in the native state. It is obtained from the mineral stibnite which is roasted in air to remove the sulfur. The remaining oxide is then mixed with carbon and heated in order to reduce it to the metal.

Properties:

Specific gravity6.5-6.86

Melting point630°C.

Boiling point1500°C.

Solubility:

Soluble in acids.

Uses:

In the manufacture of various alloys, bearing metal, pewter, etc.

In the production of antimony compounds.

In the manufacture of bath tub enamel.

A constituent of type metal and other lead alloys to impart hardness.

Substitutes:

Calcium may be used in place of antimony as a constituent of type metal.

Cadmium, selenium, silver and tellurium have also been found applicable as substitutes for antimony in many of its uses.

ANTIMONY LACTATE (Antinonine) $Sb(C_3H_5O_3)_3$

A tan-colored material which is obtained from the reaction between antimony hydroxide and lactic acid.

ANTIMONY OXIDE

Solubility:

Soluble in water.

Uses:

In the dyeing of textile fibers as a mordant.

Substitutes:

Antimony-potassium tartrate.

ANTIMONY OXIDE Sb_2O_3

A white crystalline powder which is odorless and tasteless.

Properties:

Specific gravity5.2

Melting point 656°C .

Boiling point 1550°C .

Solubility:

Soluble in acids.

Uses:

Substitute for stannic oxide in enamels and glazes.

In medicine it is used as a substitute for tartar emetic.

It is also used in the manufacture of ceramic enamels, paint pigments, in the manufacture of glass as a decolorizing agent, and as a textile mordant.

ANTIMONY WHITE

ANTIMONY-POTASSIUM TARTRATE (Tartar Emetic, Potassium-antimony Tartrate, Tartrated Antimony)

A poisonous white powder.

Properties:

Specific gravity2.6

Solubility:

Soluble in water and glycol.

Uses:

Dyeing with basic dyes.

Fixative for basic colors.

In the control of gladiolus thrips.

Substitute for antimony lactate as a mordant.

It is also used as an emetic in medicine and in the perfumery industry as an ingredient of various cosmetics.

Substitutes:

Zinc acetate.

Antimonelle.

Sodium-antimony lactophenolate.

ANTIMONY TRIOXIDE

See Antimony White.

ANTIMONY WHITE

Antimony trioxide. A paint pigment useful as a substitute for flake white.

APCO 467

Trade name of a petroleum solvent which is claimed to be effective in overcoming some of the short-comings of kerosene used in flat wall paints. It is said that this product as compared to 42-44° kerosene gives longer wet edge time, quicker drying time, easier brushing and fewer brush marks.

APORINO OIL

See Shiu Oil.

APPRETAN

A new German synthetic product used as a substitute for imported shellac.

AQUALIED PAPER

Trade name for a water-conditioned paper which is claimed to stand up under all conditions of moisture and soaking.

It can be used as towels, potato bags, vegetable-crate linings, wrapping for meat and other products, and locker bags for frozen foods.

It may also be used as a substitute for cloth and burlap.

AQUAMEL

See Carnauba Wax.

AQUAPLEX

Trade name for a synthetic resin emulsion paint base of the alkyd type in water dispersion. Its chief use is in coatings for porous surfaces.

AQUARESIN

Trade name for a product which is glycol bori-borate. It is an odorless, water-white viscous liquid which is non-drying.

Properties:

Specific gravity1.375 (25°C.)

pH (5% dispersion)8.0

Solubility:

Soluble in water, methyl alcohol, glycerin and diethylene glycol.

Insoluble in ethyl alcohol and toluene.

Uses:

Prevention of caking of pigments while in a water suspension.

Fire retardant.

Plasticizer for glues, gelatine, gums and resins.

Substitute for glycerin in various technical processes.

AQUARESIN G.B.

Trade name for a product which is modified glyceryl borate. It is an odorless, non-corrosive, non-toxic, water-white vis-

ARABIC GUM

ARASAN

cous liquid. It does not crystallize at any dilution.

Properties:

Specific gravity1.44 (22°C)

pH (5% dispersion)8.0

Solubility:

Soluble in water, methyl alcohol, glycerin, diethylene glycol.

Insoluble in ethyl alcohol, toluene, mineral spirits, mineral oil, vegetable oil.

Uses:

Similar to Aquaresin.

In the manufacture of lake pigments.

ARABIC GUM (Acacia Gum, Senegal Gum)

Yellow or white powder obtained from varieties of acacia.

Properties:

Specific gravity1.355

Solubility:

Soluble in water.

Uses:

Adhesives, inks, textile printing, confectionery.

Substitutes:

Dextrin.

Cibara gum.

Hydroresin.

Sodium alginate.

Superdex.

ARACHIC OIL

See Peanut Oil.

ARALAC

Trade name for a protein fiber spun from casein fashioned to blend with wool, rayon, cotton, fur and other fibers. It is claimed to be a warm interlining when used alone. It is also said to be a resilient, warm bed comforter filling and an efficient wrapper.

This product is chemically treated to resist boiling water, acids and mild alkalis.

ARASAN

Trade name for a new non-metallic seed disinfectant. It is tetramethyl thiuramdisulfide. It is claimed to be a non-wettable, finely divided powder which adheres well to the seed.

It is said that experimental results show this product to effectively reduce losses in stands of peanuts resulting from seed decay, and of vegetables from damping-off and other fungous seed-borne and soil-borne diseases. It is also indicated

ARATONE

that it may be used for the disinfection and protection of soybeans, cowpeas, velvet beans and grasses.

ARATONE 270

Trade name for a reinforcing inert material which is micaceous in character. It forms a tough elastic inorganic film skeleton because of its thin plate-like structure and its high diameter-thinness ratio.

ARC WELDING

A new method of welding which saves several percent of the weight of metal in a ship's hull, in comparison with riveting. It is faster and cheaper also. Overlapping of steel plates is avoided in welding.

ARGILLA

See Kaolin.

ARGON A

A colorless, inert gas which is found in the atmosphere in minute amounts.

Properties:

Freezing point-189.5°C.

Liquefying temperature -185.84°C.

Solubility:

Slightly soluble in water.

AROCHEM RESINS

Uses:

An inert gas for laboratory use.

As a filler for incandescent lamps and luminescent tubes.

Substitutes:

Helium.

ARMSTRONG'S NO. 841

A fibrated leather material. Claimed to offer the advantages of natural leather in large uniform rolls and sheets.

It is said to be compressible and to have a high ratio of recovery. Its dimensions and physical properties are claimed to be stable under variations of temperature and moisture. It is tough and tear-resistant.

It is useful for sealing oil, water, or gasoline, and for other general low-temperature gasketing purposes. It is not recommended for use at temperatures over 300°F. or where acids or alkalies are encountered.

AROCHEM RESINS

Trade name for a series of modified phenolics. These products are available in a number of forms.

Uses:

Used primarily in the manufacture of paints, varnishes, lacquers, inks and coatings.

In combination with linseed, oiticica or dehydrated castor oils they may be used as substitutes for tung oil.

AROCHLOR

See Chlorinated Diphenyl.

ARTIFICIAL BARYTES

See Blanc Fixe.

ARTIFICIAL GUM

See Dextrin.

ARTIFICIAL HEAVY SPAR

See Blanc Fixe.

ARTIFICIAL OIL OF ANTS

See Furfural.

ARTILANA FIBER

A German synthetic fiber which is said to have the following properties:

1. It is anti-crease.
2. It has a handle somewhat like wool.
3. It has an affinity for wool dyes which is less noticeable than that of Vistralan or Rayolandia WD.

ARYLALKYL KETONES

These are prepared from fatty acids. Examples: stearophenone $C_{17}H_{35}(CO)C_6H_5$; laurophenone $C_{11}H_{23}COC_6H_5$; diphenylheptadecyl ketone $C_{17}H_{35}(CO)C_6H_5$. They are prepared by reacting fatty acid chlorides with the respective aromatics in the presence of catalysts such as aluminum chloride.

These are generally wax-like solids which are useful as wax substitutes in polishing and cleaning compositions. The ketones prepared from phenol and high molecular weight acid chlorides can be used as the portion of phenol used in a phenol-formaldehyde resin, while those prepared from indene, coumarone, styrene or the cyclodienes can be copolymerized with more of the parent hydrocarbon for production of a large number of resins.

ASBESTINE

Trade name for a natural fibrous magnesium silicate which is white in color.

Solubility:

Miscible with water and vegetable oils.

Uses:

Inert pigment extender in paints.
In rubber, ceramics, and textiles.

Substitutes:

Prepared china clay.

ASBESTOS

ATABRINE

ASBESTOS

A variety of fibrous minerals which are silicates. There are two types: the serpentine type, Chrysotile, and the amphibole type. The commonly used term "asbestos" generally refers to the serpentine type.

Chrysotile is hydrous magnesium silicate. Its fibers are silky and strong and they may be woven.

Uses:

In the manufacture of fireproof clothing, textiles, curtains, rope, cements; in heat and electrical insulation materials, paints, etc.

Substitutes:

Mineral wool, glass fiber and Carolina vermiculite may be used as substitutes for some purposes.

Fiberglas, magnesium oxide.

Fiber glass board may be used as a substitute for asbestos board.

ASPHALT TILE

An industrial flooring material manufactured from a high melting point asphalt reinforced with tough fibers. No critical raw materials are used in the manufacture of this product. It is claimed to be excellent for installations in areas where static electricity might tend to accumulate, because of its high electrical conductivity.

It is non-sparking, non-slip, non-dusting, moisture-resistant and odorless. It

is also said to be highly resistant to indentation and that it will not attract vermine. It is further claimed to conform to all Government specifications.

Its color is plain black.

ASTROTONE SYNTHETIC MUSK

Trade name for a colorless, viscous oil possessing an odor of tonquin musk.

It boils at 125°C. at 1 mm pressure.

It is used to replace true musk as a fixative in perfumery.

ASTRULAN D

Trade name for the raw oil from which Ursulin D is made. It has the same properties as the latter. Whenever a finer and silkier surface feel is desired it is advised to use this product with Ursulin D.

When emulsified with soap and egg yolk it may be used as an alkaline fat-liquor possessing less penetrating power than a sulfonated oil. This produces a firmer leather with a smooth feel.

ATABRINE

Trade name for a dihydrochloride of methoxychlor-diethylaminoacridine.

This product is a yellow bitter powder.

Solubility:

Soluble in water only to a slight extent.

Uses:

Substitute for quinine. Treatment with this drug requires only five days. Relapses and recurrences are greatly diminished. It is well tolerated by children and pregnant women.

ATROPINE (Daturine)

A poisonous, colorless, crystalline alkaloid which is obtained by extraction from the plant *Datura stramonium*.

Properties:

Melting point114-115°C.

Solubility:

Soluble in alcohol, ether, chloroform and glycerol.

Uses:

In medicine.

AUDIO-FREQUENCY OSCILLATOR

A compact electrical unit which is finding great usefulness in the research laboratory. This unit is a typical 1000 cycle tuning fork oscillator. Its major components are assembled on a block of laminated phenolic material. A black paper base laminated plastic material is used. No other insulator than that provided by the laminated phenolic plastic is required.

AVITONE

A textile finishing agent made from non-critical petroleum. It may be used in place of fats which releases them for direct military needs. It imparts the same effect as sulfonated tallow, which makes the latter available for glycerine recovery.

B

BABASSU OIL

An oil extracted from the kernels of a Brazilian palm nut. It resembles coconut oil in its properties and uses. It is edible. When refined it is pale yellow in color.

This oil is used as a soapstock instead of coco-nut oil and palm oil.

BABBITT METAL

An alloy containing approximately 90% tin, 7% antimony and 3% copper. This term was originally applied to an alloy of the above composition but it now generally includes all soft metal bearing-linings. There are many different Babbitts but they can be classified into two main groups.

1. Tin-Base Metals.

80-90% Tin.

3-10% Copper.

5-10% Antimony.

Uses:

For modern machinery where is encountered high bearing pressure, high heat, and rapidly changing lead requirements.

2. Lead-Base Metals.

70-90% Lead.

0.5-9% Tin.

9-20% Antimony.

Uses:

Its self-lubricating properties are excellent. Its hardness and compressive are fair and it possesses low tensile strength and elongation.

Substitutes:

Experiments are being carried out with tin-free babbitt metal.

Durite and Ryertex are also being used.

High lead-bearing metals may replace high tin type of babbitt.

Guaiac wood.

Iron plated with indium.

BAGASSE

This is the fiber that remains after sugar cane is crushed to extract the juice. It is quite tough and serves as an excellent insulating material.

It may be used in place of cellulose for many of its purposes.

BAKELITE

Trade name for a great number of plastic materials which are available in the form of molding powders, coating and calendering materials, impregnating materials, resinous cements, bonds and adhesives, laminating varnishes for the production of laminated plastics, flexible resins, oil-soluble resins, etc.

The following is a short list of the Bakelite products:

Molding materials.

Two classes—thermosetting and thermoplastic.

The thermosetting materials are the phenolics and ureas. The thermoplastic materials are cellulose acetates and polystyrenes.

BAKELITE (Cont.)

Phenolics:

Available in stock colors and black, brown and mottles effects.

Uses:

Electrical insulators, adding machine housings, oil-well valves, etc.

Ureas:

Possess excellent resistance to color changes, tensile strength, resistance to alcohol, good dielectric properties.

Uses:

Bed lamps, neon sign frames, radio cabinets, buttons, kitchen utensils, knobs, dials, etc.

Cellulose Acetates:

Available in practically any color, in opaque, translucent, and crystal clear forms. They are claimed to be very tough and resilient. Their impact resistance is high.

Uses:

Steering wheels in automobiles, toys, knife and tool handles, goggle frames, radio parts, etc.

Polystyrene:

Crystal clear, water-white material. It is very water-resistant and is resistant to many alkalies and acids. It is light but strong.

Uses:

Combs, electrical parts, packaging, bottle caps, novelties, etc.

Cast Resins:

These are pure resins with the consistency of molasses. They are available in sheet, tubes, or rods in a great number of colors.

Uses:

Radio cabinets, knife handles, knobs, brush-backs, buttons, costume jewelry, containers, displayers. A special type is available for laboratory ware.

Laminating Plastics:

Sheets of paper or fabric are impregnated with thermosetting resin solutions. The sheets are stacked to the thickness required and unre the influence of heat and pressure compressed to a solid mass. These can be planned, milled, drilled, sawed, punched, and threaded.

Uses:

Helmets, gears, venetian blinds, signs, bearings, table tops, piping, etc.

Bonding Materials:

Special resins have been developed for use as a strong bonding material.

Uses:

High speed abrasive wheels are bonded with these resins. Also used in the manufacture of brake-linings for motor vehicles.

Printing Materials:

Two classes:

Phenolic Matrix Materials.

Printing Plate Materials.

Vinylite plastics—provide plates to replace the present electrotypes and stereotypes.

Rubber compounds—provide duplicate plates suitable for oil- and aniline-ink printing on flat-bed or high-speed rotary presses.

Plybonds:

Synthetic wood-adhesives.

BAKING ENAMELS

A great many uses for Bakelite resins are found in the paint and varnish industries.

BAKING ENAMELS

These enamels are compounded mainly with modified alkyd resins of the oxidizing types, or combinations of alkyd resins with oil-modified phenol aldehyde resins, vinyl resins, etc. They are of general use in the finishing of automobiles, furniture, etc. They generally dry to a hard film in from 45 to 60 minutes at temperatures ranging from 200°F. to 350°F.

BAKING SODA

See Sodium Bicarbonate.

BALATA

See Chicle Gum.

BANEWORT

See Belladonna.

BANROC

Trade name for a rock wool. It is claimed to be stable, permanent, fire-proof and to possess high insulating efficiency.

BARITE

See Barium Sulfate.

BARRETAN

BARIUM SULFATE (Barytes, Barite, Heavy Spar, Tiff) BaSO_4

White crystalline powder.

Properties:

Molecular weight233.43

Specific gravity4.25-4.50

Melting point
decomposes at 1580°C.

Solubility:

Soluble in concentrated sulfuric acid.

Insoluble in water, alcohol, dilute acids.

Uses:

In the manufacture of rubber goods.

When properly purified it may be used as a substitute for zinc oxide in toilet preparations.

Substitutes:

Anhydrous calcium sulfate, celestine, charcoal, ground earthenware, molochite (a china clay product), slate flows, strontium sulfate,

BARM

See Yeast.

BARRETAN

Trade name for a series of synthetic tanstuffs.

BARYTES

See Barium Sulfate.

BASSORA GUM

A group of highly colored gums, somewhat similar to tragacanth gum. The most important ones are Indian gum and kutteera gum.

BASSORIN (Tragacanthin, Adraganthin)

When tragacanth gum is treated with water several times and then filtered there is obtained this mucilaginous mass which is slimy and non-adhesive. It dissolves in the presence of alkalies.

This material is considered to be analogous to calendulin.

BAUXITE $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$

A naturally occurring hydrated aluminum oxide. It may occur either white, red, yellow, brown or black with a dull or earthy luster. The ore is found in the United States, France, Italy and Ireland.

Properties:

Specific gravity2.4-2.5

Uses:

When thermally activated it produced a highly efficient absorbent for the refining of sugar syrups and liquors. It is claimed to be superior to bone char in ash and

invert adsorption and the filtrates are of a higher purity than those produced by char. Since it is inorganic, regeneration is easy and rapid by the application of heat in the presence of oxygen, after being washed.

It is the most important source of aluminum.

Substitutes:

Leucite has been suggested as a source of aluminum instead of bauxite.

BAY-BERRY WAX (Myrtle Wax)

A greenish colored wax obtained when the berries of myrica are boiled. The wax on the berries melts and floats to the surface. It is bitter tasting with a slight odor.

Properties:

Specific gravity0.933 (15°C.)

Saponification value198-199

Iodine value68-80

Solidifying point.....25°C.

Solubility:

Partly soluble in alcohol.

Uses:

In the manufacture of candles to impart a pleasant odor when burned.

Substitutes:

Japan wax.

Diethylene glycol distearate.

BEAN OIL

See Soy-Bean Oil.

BECKACITE

Trade name for a series of modified phenolic and non-phenolic or maleic ester synthetic resins. They are used in the manufacture of clear varnishes, oleoresinous enamels, printing ink vehicles, etc.

BECKAMINE

Trade name for a series of urea-formaldehyde and melamine resins used in the preparation of clear and pigmented industrial finishes of the baking type.

BECKOLIN

Trade name for a series of synthetic drying oils available in two types, light and dark. They are used in the production of paint, varnish and enamel products.

BECKOPOL

Trade name for a series of synthetic resins prepared by phenolating copal gum. They are used primarily for the production of extremely hard varnishes, such as the rubbing and polishing types.

These resins are soluble in oils, acetates, turpentine, aromatic and aliphatic hydrocarbons.

BECKOSOL

Trade name for a series of synthetic resins, mostly of the pure alkyd and alkyd modified with phenol group. They are available both in the solid and solution form. They are used in the preparation of paints, lacquers, enamels, industrial and architectural surface coatings of all kinds.

BEESWAX

This wax is obtained from the honeycomb of the common bee. It is melted in hot water and allowed to harden in molds. It is purified by washing and bleaching by exposure to the sun or by the use of some bleaching agent such as chromic acid, nitric acid, hydrogen peroxide or ozone.

Properties:

Melting point63-64°C.

Specific gravity0.965-0.969

Solidifying point60.5-62°C.

Saponification value88-96

Iodine value8.8-10.7

Acid value16.8-20.6

Refractive index
1.4538-1.4566 (25°C.)

Solubility:

Soluble in alcohol, ether, acetone, chloroform.

Uses:

Candle making, leather dressing, shoe polishes, cements, chewing gum, adhesives, transparent paper, cosmetics, process engraving.

Substitutes:

Montan wax, Japan wax, Candelilla wax, Carnauba wax, B Z Wax A, Flexo Wax C, Flax wax, Sugarcane wax.

Ozokerite.

BEETLE RESINS

Trade name for a series of urea-formaldehyde resins used primarily in the formulation of baking enamels, in textile treatments, adhesives, etc.

BELLADONNA (Banewort, Divale)

The leaves and roots of a perennial bush which grows in southern Europe, Asia Minor and northern Africa. It is also cultivated in the United States and England.

Uses:

It contains atropine and hyoscyamine. The leaves and roots are used as a source of these alkaloids and as a sedative, antispasmodic mydriatic, anodyne and narcotic.

Substitutes:

Atropine.

Stramonium.

BENALITE

Trade name for a Masonite product of great density. It is said to resemble marble.

BENGAL GELATIN

See Agar-Agar.

BENGAL ISINGLASS

See Agar-Agar.

BENI OIL

See Sesame Oil.

BENNE OIL

See Sesame Oil.

BENTONITE (Wilkinite, Colloidal Clay)

A plastic clay-like mineral of varying color composed mainly of silicon dioxide and aluminum oxide. It usually swells enormously upon wetting. It has a specific gravity of about 2.3.

Uses:

Increases plasticity of ceramic clays.

Bonding agent in graphic crucibles.

Pencil leads.

Bonding agent in molding sands.

Clarifying agent in sewage and disposal plants, etc.

Substitutes:

Fullogel (a treated fuller's earth).

BENZAL CHLORIDE**BENZOIC ACID****BENZAL CHLORIDE**

See Benzyl Dichloride.

BENZALDEHYDE (Benzoic Aldehyde, Bitter Artificial Oil of Bitter Almonds, Benzoyl Hydride). C_6H_5CHO

A fragrant volatile oil which may be either colorless or yellowish. Its odor resembles that of oil of bitter almonds.

Properties:

Specific gravity1.0504

Melting point-135°C.

Boiling point179.9°C.

Solubility:

It is miscible with ether, alcohol and oils.

Uses:

Substitute for oil of bitter almonds in food products.

It is also used in organic synthesis, as a solvent for oils, resins, and cellulose acetate and cellulose nitrate.

In the manufacture of synthetic perfumes, cinnamic acid, benzoic acid, and in dyes, toilet preparations and soaps.

BENZENE (Benzol, Phenyl hydride, Coal Naptha, Motor Benzol) C_6H_6

Colorless liquid with a high refractive index. It is inflammable. It has a characteristic odor.

Properties:

Molecular weight78.05

Melting point5.4°C.

Boiling point79.7°C.

Specific gravity0.879 (20°C.)

Flash point15°C.

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

In paint and varnish removers.

Substitutes:

Dichloroisopropyl ether.

Mixture of chlorinated hydrocarbon, acetone and denatured alcohol.

Small amounts of wax are also used in this mixture. The chlorinated hydrocarbon is a mixture of the chlorides of methane, propane and ethane.

Shell Benzo-Sol.

BENZOFURANE RESIN

See Coumarone, Para.

BENZOIC ACID (Flowers of Benzoïn, Phenylformic Acid, Phenylmethanic Acid). C_6H_5COOH .

An organic acid possessing the odor of benzoïn or benzaldehyde.

BENZOIC ALDEHYDE

Properties:

Molecular weight	122.05
Specific gravity	1.266
Melting point	121.2° C.
Boiling point	249.2° C.

Solubility:

Soluble in alcohol, ether, chloroform, benzene, carbon bisulfide, carbon tetrachloride, turpentine.

Slightly soluble in water.

Uses:

In chemical synthesis, manufacture of dyes, as a food preservative, in the manufacture of paint and varnish, in the paper industry, as a fixative in perfumes (in place of benzoin), in textile bleaching, etc.

Substitutes:

Cumic acid.

Moldex.

BENZOIC ALDEHYDE

See Benzaldehyde.

BENZOIN (Phenylbenzoylcarbinol, Oxy-phenylbenzylketone) $C_6H_5CH(OH)COC_6H_5$.

When benzaldehyde is condensed in the presence of aqueous potassium cyanide yellowish crystals of this material are formed.

BENZOYL PEROXIDE

Properties:

Molecular weight	212.10
Melting point	133-137° C.
Boiling point	343-344° C.

Solubility:

Insoluble in cold water.

Soluble in hot alcohol.

Uses:

As a fixative in perfumes.

Substitutes:

Benzoic acid.

Peru Balsam.

BENZOL

See Benzene.

BENZOYL HYDRIDE

See Benzaldehyde.

BENZOYL PEROXIDE (Lucidol) $(C_6H_5CO)_2O_2$

An odorless, white solid which is crystalline in structure. It is obtained as a product of the reaction between benzoyl chloride and barium peroxide.

BENZOPHENONE

Properties:

Melting point103.105°C.
(decomposes)

Solubility:

Soluble in most organic solvents.
Slightly soluble in alcohol.
Insoluble in water.

Uses:

Organic synthesis.
Bleaching agent for oils, waxes, flour,
etc.

Substitutes:

Hydrogen peroxide.

BENZOPHENONE (Diphenylketone) (C_6H_5)₂CO

Colorless crystals.

Properties:

Specific gravity1.0976
Melting point48°C.
Boiling point305.9°C.

Solubility:

Soluble in alcohol and ether.
Insoluble in water.

Uses:

Substitute for pyrethrum as an insecti-
cide.

BENZYL CARBINOL

It is also used in organic synthesis and
as a fixative in perfumes.

BENZYL BENZOATE $C_6H_5CH_2OOC C_6H_5$

A liquid, water-white in color. It freezes
readily. It possesses a faint aromatic odor.

Properties:

Specific gravity1.119
Boiling point325°C.
Melting point20°C.
Refractive index1.568-1.569

Solubility:

Soluble in alcohol and ether.
Insoluble in water.

Uses:

Substitute for camphor in the making
of celluloid, pyroxylin plastic composi-
tions.

It is also used as a fixative and solvent
in perfumes.

BENZYL BICHLORIDE

See Benzyl Dichloride.

BENZYL CARBINOL

See Phenylethyl Alcohol.

BENZYL CELLULOSE

BENZYL CELLULOSE

See Ethyl Cellulose.

BENZYL DICHLORIDE (Benzylidene chloride, Benzyl bichloride, Benzal chloride, Benzylene chloride, Chlorobenzal) $C_6H_5CHCl_2$

An oily colorless liquid with a faint aromatic odor.

Properties:

Melting point161.1°C.

Boiling point212.4°C.

Specific gravity1.295

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

In Chemical Warfare Service shells used for experimental purposes, as a substitute for mustard gas because of their similar physical properties.

BENZYLENE CHLORIDE

See Benzyl Dichloride.

BENZYLIDENE CHLORIDE

See Benzyl Dichloride.

BICHROMATE OF SODA

BERYLLIUM Be

This metal is very difficult to prepare in a highly pure state. It is a grayish-white, light metal, rather hard.

Properties:

Melting point1284°C.

Specific gravity1.816

Tensile strength
25000 lbs. per sq. in (approx.)

Its chemical properties are similar to those of magnesium and aluminum.

Solubility:

Soluble in dilute acids and alkalies.

Uses:

It was not until 1932 that its use as an alloying agent with copper acquired commercial importance. Beryllium-copper alloy is about 50% stronger than its nearest competitor of the copper alloys. It has a low modulus of elasticity and a high elastic limit. Its electrical conductivity is high. It has been found to be very satisfactory for welding arms and electrodes.

The alloys of beryllium with aluminum show distinct promise in aircraft design.

Substitutes:

It has been found that lithium may be used in place of beryllium for many of its uses.

BICHROMATE OF SODA

See Sodium Bichromate.

BIMETHYL

BIMETHYL

See Ethane.

BIRCH OIL (Birch Tar Oil)

A poisonous brown liquid which possesses an odor resembling that of Russian leather. It is obtained by the distillation of birch-tar.

Properties:

Specific gravity0.956

Solubility:

Soluble in alcohol, ether, chloroform, amyl alcohol, glacial acetic acid, benzene, carbon bisulfide.

Uses:

In the treatment of skin diseases.

As a disinfectant.

In leather dressing.

Substitutes:

Cade Oil may be used in place of birch oil in the treatment of skin diseases.

BIRCH TAR OIL

See Birch Oil.

BISMUTH OXYCHLORIDE (Pearl White, Bismuth Subchloride, Bismuthyl Chloride, Cosmetic Bismuth)

A white powder which is crystalline in structure. It may be obtained by reacting

BISMUTH SUBNITRATE

water and bismuth chloride or by the interaction of dilute nitric acid solution of bismuth nitrate and sodium chloride.

Properties:

Specific gravity7.717

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

Substitute for bismuth subnitrate in compounding and dispensing practice.

It may also be used as an ingredient of creams, face powders and lotions.

In the paint and varnish industry it is used as a pigment. It is also used as a pigment in artificial pearls.

BISMUTH SUBNITRATE (Spanish White) $\text{BiONO}_3 \cdot \text{H}_2\text{O}$

A heavy white powder which is obtained by adding bismuth nitrate to water with subsequent filtering and drying.

Properties:

Specific gravity4.928

Melting point
decomposes at 260°C .

Solubility:

Soluble in acids.

Insoluble in water.

BISMUTH SUBCHLORIDE**BLANC FIXE****Uses:**

In the pharmaceutical field it is used in compounding and dispensing practice.

It is also used in the ceramic industry and in cosmetics.

Substitutes:

Bismuth oxychloride may be used in the place of bismuth subnitrate in compounding and dispensing practice.

BISMUTH SUBCHLORIDE

See Bismuth Oxychloride.

BISMUTHYL CHLORIDE

See Bismuth Oxychloride.

BITTER ARTIFICIAL OIL OF BITTER ALMONDS

See Benzaldehyde.

BLACK-BOY GUM

See Acaroid.

BLACK BALSAM

See Peru Balsam.

BLACK LEAD

See Graphite.

BLACK SASSAFRAS

See Oliver's Bark.

BLANC D'ARGENT

See Cremnitz White.

BLANC FIXE (Precipitated Barium Sulfate, Synthetic Barytes, Artificial Barytes, Artificial Heavy Spar, Permanent White, Terra Ponderosa)

A heavy white powder.

Properties:

Specific gravity4.476

Solubility:

Insoluble in water.

Uses:

Pigment for paints, filler for textiles, rubber, linoleum, oilcloth, white lead substitute, photographic paper, etc.

Substitutes:

Mixture of 70% precipitated barium sulfate and 30% precipitated calcium carbonate.

Blancal C, a precipitated barium-calcium compound.

BLANCAL C

BONE CHAR

BLANCAL C

Trade name for a precipitated barium-calcium compound which is claimed to be useful as a substitute for blanc fixe.

eries. By mixing it with graphite or lamp-black, there is produced a paint suitable for pipe, stack or boiler front.

BLAND OIL

See Almond Oil.

BOLUS ALBA

See Kaolin.

BLUBBER OIL

See Whale Oil.

BONDERIZED STEEL

Steel protected with a coating of iron phosphate by means of a special process. For special purposes this is finished with a lacquer film.

BLUE POWDER

See Zinc.

BONEBLACK (Animal black, Animal charcoal, Bone char, Char, Drop black, Ivory black, Ivory drop black, Virgin drop black)

BODY OIL

See Whale Oil.

This material is prepared by the destructive distillation of degreased bones in iron retorts.

BOILED OIL

See Linseed Oil.

Uses:

Clarifying agent as a substitute for activated carbon.

BOLTACEM

Trade name for a gasket cement used for bolted tanks to replace the higher cost of shellac and alcoholic gums solutions. It is also used in the manufacture of aluminum bronze paints and as a general utility oil around factories and refin-

It is also used as a pigment of lower covering value.

BONE CHAR

See Boneblack.

BORAX

BORAX (Sodium Borate, Tincal, Tinkal,
Sodium Tetraborate, Zola) $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$

Natural sodium borate, white in color, solid material being crystalline or amorphous in structure.

Properties:

Molecular weight381.43

Specific gravity1.69-1.72

Melts at red heat.

Solubility:

Soluble in water and glycerine.

Insoluble in alcohol.

Uses:

Solvent and plasticizer for aqueous solutions of casein and shellac.

Raw material for the manufacture of commercial borax.

In ceramic processes.

Borax may also be used as a preservation for glues, cosmetics, creams, explosives, foods, gelatin, printing inks, hides, cork, wood.

It has found use as a fire-proofing agent for textiles and wood.

Other uses include waterproofing agent, in abrasives, as a bonding agent in cement and concrete, as a hardening agent for plaster of Paris, an ingredient of hair remedies, electrical apparatus, germicide and bactericide, in the manufacture of special types of glass, etc.

Substitutes:

Trigamine.

Colemanite.

Titanium dioxide.

Boric acid may be used in place of borax as a fireproofing agent for wood and many other products.

Lead silicate may replace borax as a fireproofing agent for textiles.

As a preservative for foods potassium fluoride may be used.

BORIC ACID H_3BO_3

A white powder or crystals. It may be obtained by the action of hydrochloric acid or sulfuric acid on a solution of borax with subsequent crystallization.

Properties:

Specific gravity1.4347

Melting point184°C.

Solubility:

Soluble in water and alcohol.

Uses:

As a substitute for borax as a fireproofing and water proofing agent.

It may also replace borax as a general preservative.

It is used, furthermore, in the leather industry, as a special lubricant, in metallurgy, in paints and varnishes, etc.

Boric acid may be used as a mild antiseptic.

BORNEO TALLOW

BORNEO TALLOW (Green Butter)

Name for a large variety of fats obtained from the fruit of the *Dipterocarpus* family.

It is used as a substitute for cacao butter.

BOROLON

Trade name for boron carbide, which see.

BORON CARBIDE B_2C

Hardest synthetic material yet made. It is prepared in the electric furnace by heating boron oxide with carbon. Boron carbide is harder than tungsten carbide, silicon carbide, and crystallized alumina. It is a black material and possesses a glass-like fracture.

Properties:

Molecular weight76.92

Specific gravity2.51

Solubility:

Insoluble in water and alcohol. It is unaffected by the strongest acids and alkalis.

Uses:

Having a comparative strength of 260,000 lbs. per sq. in. its use is found in the cutting of hard alloys, manufacturing dies, wear-resistant bearings, abrasives, etc.

BRICK, CHROME

BRASS

An alloy of zinc and copper with varying composition. Some lead or tin is at times included in the formulation. Small amounts of other metals are also added.

A great deal of work has been done in finding substitutes for brass.

Cartridge cases were formerly made of brass but under the present circumstances it has been found that soft steel lined with a thin layer of copper or brass will serve the purpose.

Brass plumbing has been replaced by glass plumbing.

Masonite has taken the place of brass for a great number of purposes.

Among other substitutes may be mentioned the following:

Cast iron, silver plate, porcelain, plastics, enameled and plated steel, etc.

BRAZIL WAX

See Carnauba Wax.

BREA GUM

A gum derived from the tree *Cesalpinia precox* which is found in Brazil. It is used as a substitute for acacia.

BRICK, CHROME

These are refractory bricks made with chrome ores. Because they are less expensive than magnesia brick, they are used to some extent to replace the magnesia brick.

BRICK, MAGNESIA

Magnesite brick consisting essentially of MgO with about 15% of other oxides. It is used in severe cases of corrosion from basic slags. They are rather expensive, have lower mechanical strength at elevated temperatures, and possess greater thermal expansion.

It has been found that chrome brick may be used to some extent in place of magnesia brick.

BRITISH GUM

See Dextrin.

BRONZE

An alloy of copper and tin with varying composition. Some lead or zinc is at times included in the formulation. Small amounts of other metals are also added.

Commercial bronze is generally used in the manufacture of grillwork, forgings, hardware, primer caps, rotating bands, screws and rivets. It contains 90% copper and 10% tin.

Architectural bronze contains 58% copper, 39% zinc and 3% lead.

Substitutes:

Babbitt has been found useful in many applications.

Glazed ceramics, textiles laminated with synthetic resins, and impregnated wood can replace bronze in some of its uses.

BUBBLFIL

Trade name for a material which is claimed to be as buoyant as kapok or sponge rubber. It may be used to replace these products. It is said to be very light and to possess high strength, resiliency and low thermal conductivity.

This product, chemically, is the same as cellophane or rayon. It is a regenerated cellulose material made by the viscose process. Air is trapped in a continuous stream of cellophane bubbles. It is claimed to be stable to extreme variations in temperature.

Uses:

Substitute for kapok and sponge rubber. It may be used in life rafts, for bridge pontoons and for shock absorbing materials. It can be formed into mats and cushions by using adhesives. Flame-resistance can be imparted to it by chemical treatment.

BUNA S

Trade name for a copolymer of butadiene and styrene. It is said to resemble natural rubber to some extent. This product is not resistant to oils. However its resistance to abrasion and chemicals is good and it possesses good electrical properties.

Buna S can be vulcanized to all degrees of hardness. The products formed resemble products of similar hardness made from rubber with respect to chemical resistance and electrical properties.

It is possible to bond Buna S to metal and because of this property it may be

BURNT LIME

used as tank lining material to replace rubber.

As a general rubber substitute Buna S may be used in every application of natural rubber.

BURNT LIME

See Calcium Oxide.

BURNT MAGNESIA

See Magnesium Oxide.

BUTACITE

Trade name for a polyvinyl acetal resin. It is very clear and when laminated it is resistant to the deteriorating effects of heat, light and moisture. It possesses the ability of stretching and yielding under impact.

Uses:

In safety glass it serves as the transparent layer between the sheets of glass.

It can be used as a coating for fabrics from which raincoats, life rafts and belts, food and water bags, waterproof and oil resistant suits, etc. are made. It is lighter than rubber and equal to it in wear resistance.

Butacite can also be made into tubing so that it replaces rubber tubing. As an adhesive it is replacing rubber latex.

BUTADIENE

An unsaturated hydrocarbon which is obtained from petroleum and other sources. It is the raw material from which the Buna rubbers are prepared. These rubbers are obtained by the polymerization of butadiene. A much better product is obtained if butadiene is caused to interpolymerize with other compounds containing an active vinyl group such as styrene, acrylonitrile, vinylidene chloride, etc.

Butadiene is a gas which is stored as such or liquefied under pressure.

BUTANE (Butyl Hydride, Methylene methane) C_4H_{10}

A colorless gas with a natural gas odor. It has no corrosive action on metals and does not react with moisture.

Properties:

Boiling point $-0.3^{\circ}C$.

Melting point $-139.0^{\circ}C$.

Critical temperature $153.2^{\circ}C$.

Critical pressure
525 lbs. per sq. in. (absolute)

Uses:

Fuel for household and industrial use.

Substitutes:

VX Blends—trade name for a mixture of propane and some undisclosed ingredient. It is claimed to burn safely, efficiently and economically in the existing butane equipment and appliances.

BUTANEDIOL

Acetylene may be used in place of butane as a fuel in internal combustion engines.

Propane may also be used for the same purpose. In general propane may be used in place of butane for most of its uses.

BUTANEDIOL

See 2-3-Butylene Glycol.

BUTANOL

See Butyl Alcohol.

BUTTER

Substitutes for butter are many. Among some of them are the following: cotton-seed oil, coco-nut oil, lard, oleomargarine.

BUTTERINE

See Cacao Butter.

BUTYAR

Trade name for a synthetic resin which belongs to the polyvinyl butylal group. It is water-white in color.

Solubility:

Soluble in ethyl alcohol, isopropyl alcohol, and diacetone alcohol.

BUTYL BORATE

Uses:

In the manufacture of safety glass as the interlayer.

BUTYL ALCOHOL, NORMAL, (Butanol, Butyric Alcohol) $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$

A colorless liquid.

Properties:

Boiling point117.7°C.

Freezing point-89.8°C.

Specific gravity0.8108 (20°C.)

Solubility:

Soluble in water.

Miscible with most of the common organic solvents.

Uses:

In the thinning of lacquers.

As a shock-absorbing fluid.

As a hydraulic brake fluid.

Substitutes:

Fusel oil.

BUTYL BORATE $(\text{C}_4\text{H}_9)_3\text{BO}_3$

Water-white liquid which is high-boiling. It is very stable to heat in the absence of moisture. In the presence of water it hydrolyzes rapidly to form boric acid and butanol.

BUTYL CELLUSOLVE PALMITATE

Properties:

Specific gravity 0.858-0.859 (20°C.)
Melting pointbelow 65°C.
Flash point87.5°C.
Refractive Index1.4091 (20°C.)

Solubility:

Decomposes in the presence of water.
Miscible with most organic solvents.

Uses:

It dissolves ester gums, naphthalene and benzoic acid. It is not a solvent for vinyl resins, nitrocellulose or cellulose acetate.

It is claimed to improve the adhesive qualities of cellulose ester lacquers and to impart fire-resistant qualities to the film.

BUTYL CELLOSOLVE PALMITATE

A semi-solid which is amber colored.

Properties:

Specific gravity0.89
Melting point44°C.
Acid value7-8
Iodine value2.5

Solubility:

Soluble in methyl alcohol, ethyl alcohol, toluene, acetone, ethyl acetate, mineral oil, naptha.

BUTYL RUBBER

Uses:

Nitrocellulose plasticizer.
Synthetic wax useful in the treatment of textiles, cosmetics, etc.

BUTYL OLEATE

Light colored liquid with a mild odor.

Properties:

Specific gravity0.873 (20°C.)
Flash point180°C.
Freezing point
 Becomes opaque at 12°C.
Iodine value76.8

Solubility:

Miscible with vegetable oils and mineral oils.

Insoluble in water.

Uses:

Substitute for dibutyl phthalate as a plasticizer.

BUTYL RUBBER

Trade name for a hydrocarbon polymer which is obtained as a result of the copolymerization of an olefin and a diolefin. It resembles natural rubber in the unvulcanized and vulcanized state.

BUTYL RUBBER

Properties:

Specific gravity0.91

Tensile strength
500-3000 lbs. per sq. in.

Maximum temperature for use
250-300° F.

It is claimed that this substitute rubber possesses a chemical unsaturation which is much less than that present in natural rubber. It undergoes thermal curing in the presence of sulfur. If this curing is assisted by many of the common rubber accelerators as well as by zinc oxide or fatty acids its tensile strength is increased, its cold or hot flow properties are suppressed and its elongation is reduced.

The resilience of butyl rubber is lower than that of natural rubber at room temperature but with an increase in the temperature there is a corresponding increase in the resiliency. In certain cases the abrasion resistance is superior to that of natural rubber but in other cases it is inferior.

It is said that butyl rubber is superior to natural rubber in the following properties:

Resistance to water absorption.

Aging in storage and sunlight.

Resistance to the action of air and ozone

Resistance to deterioration by heat.

Resistance to the action of nitrogen-containing solvents.

Resistance to oxygenated solvents.

Resistance to swelling in vegetable and animal oils.

Resistance to many corrosive chemicals.

Extremely low gas permeability.

BUTYLENE GLYCOL

Uses:

Butyl rubber is applicable in nearly all uses of natural rubber.

It may be used for wire insulation, gloves, clothing, belts, flooring, tires, gas masks, inner tubes, steam hoses, vibration dampeners, etc.

BUTYL STEARATE

A colorless material which solidifies at 19°C. It is stable, with a faint fatty odor.

Properties:

Specific gravity0.855-0.857

Flash point187.8°C.

Melting point19.5-20°C.

Refractive index1.4446

Solubility:

Miscible with vegetable and mineral oils.

Insoluble in water.

Uses:

Substitute for dibutyle phthalate as a plasticizer.

2-3-BUTYLENE GLYCOL (Butanediol) $\text{CH}_3\text{CHOHCHOHCH}_3$

A nearly colorless solution or crystalline solid which is hygroscopic.

BUTYRIC ACID

BZ WAX A

Properties:

Molecular weight	90.08
Specific gravity	1.048
Melting point	23-27°C.
Boiling point	179-182°C.
Refractive index	1.438 (20°C.)

Solubility:

Miscible with water in all proportions.
Soluble in alcohol and ether.

Uses:

Used to replace glycerin or other glycols in formulations where its modified properties offers some advantage.

BUTYRIC ACID, NORMAL. (Propylformic Acid, Ethylacetic Acid) $\text{CH}_3(\text{CH}_2)_2\text{COOH}$

A colorless liquid with a strong characteristic rancid odor.

Properties:

Specific gravity	0.9599
Melting point	-3.12°C.
Boiling point	162.3°C.
Vapor pressure 0.84 mm. (20°C.)	
Flash point	170°F.

Solubility:

Soluble in water, alcohol, ether.

Uses:

Because it is weaker than acetic acid or lactic acid and its calcium salt is soluble in water, it has been used to advantage in tanneries for the deliming of hides. The lacquer industry has reported that the cellulose esters are useful in their formulations because they are stable to light and are water-resistant.

BUTYRIC ALCOHOL

See Butyl Alcohol.

B Z WAX A

Trade name for a hydrocarbon fatty acid material. It is a light brown wax, with a dull luster.

Properties:

Melting point	61°C.
Specific gravity	0.92 (25°C.)

Solubility:

Soluble (hot) in naphtha, mineral spirits, mineral oil, toluol, vegetable oil.

Insoluble in water, ethyl alcohol, methyl alcohol.

Uses:

Substitute for beeswax in technical applications.

C

CABBAGE-SEED OIL

A species of mustard oil which may be used as a substitute for olive oil in various technical applications.

CACAO BUTTER (Theobroma Oil, Cocoa Butter, Butterine, Cacao Oil)

A brittle solid fat, yellowish in color, It possesses a chocolate odor and taste.

Properties:

Specific gravity	0.976-0.995
Saponification value	192-200
Iodine value	32-37.7
Melting point	30-35°C.

Solubility:

Soluble in ether, chloroform, benzene, alcohol.

Uses:

Toilet soaps, confectionery.

Substitutes:

Borneo Tallow.

Dika fat may be used instead of cacao butter as a base material in cosmetic preparations. When this butter is used in

candies, vegetable oil stearins may be substituted.

Any of the following may be substituted for cacao butter in its technical applications: postonal (a polymer of ethylene oxide), mixtures of hydrogenated sunflower-seed oil and waxes, tokum butter.

CACAO OIL

See Cacao Butter.

CADE OIL (Cadmium Oil)

A dark brown liquid which is thick and clear. It possesses a tarry odor and a bitter taste. This oil is obtained by the dry distillation of the wood of the European juniper tree.

Properties:

Specific gravity	0.950-1.055 (25°C)
Refractive index	1.468-1.504 (20°C.)

Solubility:

Soluble in chloroform, ether.

Partly soluble in alcohol.

CADMIUM

Uses:

In the treatment of skin diseases it may be used in place of birch oil.

It is also used in the manufacture of animal soap and in ointments.

CADMIUM Cd

A metal which is bluish-white in color, ductile and malleable. It tarnishes in air and when heated it burns.

Properties:

Atomic weight	112.41
Specific gravity	8.65 (20°C.)
Melting point	320.9°C.
Boiling point	778°C.

Solubility:

Soluble in acids and in ammonium nitrate solution.

Insoluble in water.

Uses:

Cadmium plating is a competitor of zinc plating. An undercoat of cadmium plate is frequently used in place of a nickel plate. Cadmium alloys are used to replace babbitt bearings in low-and medium-power automobile and aircraft engines. These alloys include such combinations as cadmium-silver, cadmium-nickel, cadmium-silver-copper.

Substitutes:

Clear lacquer is a substitute for cadmium plating.

CALCIUM MAGNESIA

CADMIUM-LEAD SOLDER

A new tin-free solder containing about 6-8% cadmium and about 0.5% tin, or no tin at all, with small additions of zinc, copper, phosphorus, or arsenic in order to control the melting point and other properties.

This new solder has been tested in the manufacture of small metal parts used in electrical apparatus and in the soldering of large metal sheets. It has been used with iron, copper, brass, zinc, lead and silver.

It melts at 258°C. and its breaking strength ranges from 160-325 kg.

CADMIUM OIL

See Cade Oil.

CAHOUN OIL

See Cohune Oil.

CAHUNE OIL

See Cohune Oil.

CALCINED MAGNESIA

See Magnesium Oxide.

CALCITE

CALCITE (Iceland Spar)

Certain polarizing optical instruments require crystals of calcite. This was formerly obtained from Iceland but during World War 1 the mines were flooded to prevent the calcite from weathering. Recently large deposits of this mineral were found in New Mexico. The crystals obtained from this deposit were found to be of excellent quality.

CALCIUM Ca

A soft white metal. When freshly cut it possesses a brilliant crystalline surface.

Properties:

Atomic weight	40.07
Specific gravity	1.5446
Melting point	805°C.

Solubility:

- Decomposes water slowly.
- Soluble in acid.

Uses:

As a substitute for antimony in type metal and other lead alloys.

CALCIUM CARBIDE RESIDUE

See Acetylene-generator Waste.

CALCIUM CHLORIDE

CALCIUM CARBONATE CaCO_3

A white powder which is amorphous or colorless crystals. It is obtained when a soluble carbonate is added to a solution of calcium salt. It is also found in nature.

Properties:

Specific gravity	2.72-2.95
Melting point	decomposes at 825°C.

Solubility:

- Soluble in acids.
- Insoluble in water.

Uses:

- As a flux in metallurgy.
- In the manufacture of lime.
- In dentrifices.
- In the manufacture of pigments.
- In ceramics, glass manufacture and building stones.

Substitutes:

Calcium phosphate may be used in place of calcium carbonate in the manufacture of ceramics such as porcelain, potteries, enamels, etc.

CALCIUM CHLORIDE

Several forms of the product are available on the market. All of them contain the basic elements CaCl_2 . The anhydrous form is CaCl_2 . Two other forms contain either one molecule of water or 6

CALCIUM CHLORIDE

molecules of water corresponding to the formulae $\text{CaCl}_2 \cdot \text{H}_2\text{O}$ or $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$.

The crystals are white in color and are deliquescent. It is also available in the form of lumps or granules.

Properties:

Specific gravity CaCl_2 -2.152
 $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ -1.654

Solubility:

Soluble in water and alcohol.

Uses:

It is used mainly as a dehydrating agent.

Other uses include the following: food preservative, in the manufacture of fire-proof paints, in freezing mixtures, as a wood preservative, in the purification of water, etc.

Substitutes:

Drierite may be used in place of calcium chloride as a dehydrating agent. Calcium sulfate is also available for this purpose.

As a reagent in the purification of water "Doucil" may be used in place of calcium chloride.

Florite Desiccant may be used as a dehydrating agent for laboratory work.

It has been found that potassium acetate makes an excellent dehydrating agent. Sodium hydroxides may also serve the same purpose. Sulfuric acid has been used as a dehydrating agent.

CALCIUM OXIDE

CALCIUM CYANAMIDE (Lime Nitrogen, Nitrolim, Cyanamide) CaCN_2

A white crystalline powder which is obtained from calcium carbide when it is heated in an electric furnace in an atmosphere of nitrogen. In water it decomposes and liberates ammonia.

Uses:

As a fertilizer.

In the production of nitrogen products.

In the hardening of iron and steel.

Substitutes:

Sodium nitrate.

CALCIUM HYDRATE

See Lime, Hydrated.

CALCIUM HYDROXIDE

See Lime, Hydrated.

CALCIUM OXIDE (Lime, Quicklime, Burnt Lime, Calx) CaO

Hard white lumps.

Properties:

Specific gravity3.15-3.40

Melting point2570°C.

CALCIUM PHOSPHATE

Solubility:

Soluble in acids.

Slightly soluble in water.

Uses:

In calcium lights.

Substitutes:

Zirconium oxide.

Acetylene-generator waste may be used as a cheaper substitute for the lime element in interior and exterior plasters.

CALCIUM PHOSPHATE, TRIBASIC $\text{Ca}_3(\text{PO}_4)_2$

A white amorphous powder which is found free in nature. It may also be obtained as a product of the reaction between calcium chloride solutions and sodium triphosphate with an excess amount of ammonia present. Another method for its preparation is by means of the reaction between hydrated lime and phosphoric acid.

Properties:

Specific gravity3.18

Melting point1550°C.

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

As a substitute for calcium carbonate in the manufacture of ceramics.

CALCIUM STEARATE

It is also used in polishing powders, cattle foods, clarifying agent for sugar syrups, etc.

As precipitated form is used as an abrasive in such products as toothpastes.

CALCIUM RESINATE

An amorphous mass which is yellowish-white in color. It is obtained when calcium hydroxide is boiled with rosin.

Solubility:

Insoluble in water.

Soluble in acids.

Uses:

As a substitute for aluminum oleate as a waterproofing agent.

As a substitute for aluminum stearate as a waterproofing agent.

In the manufacture of paint driers.

Substitutes:

Aluminum resinate.

CALCIUM STEARATE

A white powder obtained from the reaction of sodium stearate and calcium chloride.

Solubility:

Insoluble in water.

Soluble in alcohol and ether.

CALCIUM SULFATE

CAMPHENE

Uses:

As a substitute for aluminum oleate as a waterproofing agent.

As a substitute for aluminum stearate as a waterproofing agent.

CALCIUM SULFATE, ANHYDROUS, CaSO_4

A white powder which is found free in nature.

Properties:

Specific gravity2.964

Melting point1360°C.

Solubility:

Insoluble in water.

Uses:

Substitute for whiting and barium sulfate in the manufacture of rubber.

In Great Britain it is used as a substitute for China clay.

As a dehydrating agent in place of calcium chloride.

CALGOLAC

Trade name for a product which is said to be useful for general cleaning operations. It is a white granular product.

CALORIZED STEEL

Aluminum is forced into the surface of the steel in order to obtain an iron-aluminum alloy. This alloy is resistant to oxidation up to temperatures of 1650°F. It is also resistant to the corrosive action of gaseous sulfur compounds.

It is claimed that this material is the most economical heat-enduring substance obtainable and that it successfully replaces nickel-chromium alloys for use within the recommended temperatures.

CALX

See Calcium Oxide.

CAMPHENE $\text{C}_{10}\text{H}_{18}$

Colorless crystals.

Properties:

Specific gravity0.8446

Melting point49.5°C.

Boiling point157°C.

Solubility:

Soluble in ether; slightly soluble in alcohol.

Insoluble in water.

Uses:

As a substitute for camphor.

CAMPHOR

CAMPHOR (Gum Camphor, Formosa Camphor, Japan Camphor, Laurel Camphor) $C_9H_{16}O$

White solid, natural crystals which are easily broken.

Properties:

Specific gravity0.986-0.996
Molecular weight152.13
Melting point175°C.
Boiling pointsublimes at 204°C.

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide, petroleum, benzene, fixed and volatile oils.

Uses:

As a plasticizer in adhesives, aviation dopes and cementing agents, cellulose acetate, cellulose ethers, etc. nail enamels, in explosives and for general cellulose products. Moth repellent.

Substitutes:

Camphene, aryl phosphates, carbon trichloride, diethyl phthalate, dinitrobenzene, ethyl acetanilide, naphthalene, dibutyltartrate, carbon trichloride, paradichlorobenzene, resorcinol, plastols.

Triacetin.

In the manufacture of celluloid and pyroxylin plastic compositions benzyl benzoate may be used in place of camphor.

CAMPHOR, SYNTHETIC $C_{10}H_{16}O$

A white solid manufactured in the United States. It is prepared from pinene.

CAMPHORATED OIL

It is used in place of natural camphor wherever applicable.

CAMPHOR OIL (Liquid Camphor, Camphorated Oil)

A colorless liquid with a characteristic odor obtained from camphor wood. It is obtained by means of the distillation of the wood of the camphor tree.

Properties:

The constants vary considerably.

Specific gravity0.870-1.040
Refractive index1.465-1.481
(20°C.)

Solubility:

Soluble in ether, chloroform.
Insoluble in alcohol.

Uses:

As an odorant.
It is also used in medicine.

Substitutes:

Jappo.

CAMPHORATED OIL

See Camphor Oil.

CANADA BALSAM

CANADA BALSAM (Canada Turpentine, Balsam of Fir)

Pale yellowish, viscous liquid, with a pine-like odor. It possesses a bitter acrid taste. When exposed to air it dries slowly to a transparent varnish.

It is derived from the plant *Abies*, balsamica.

Solubility:

Soluble in ether, chloroform, benzene.

Uses:

As a mounting medium in microscopy.

Substitutes:

Clarite.

CANDELILLA WAX

A natural yellowish-brown, solid, amorphous wax.

Properties:

Specific gravity	0.983
Melting point	67-68°C.
Saponification value.....	65
Iodine number	37
Refractive index	1.4555

Solubility:

Soluble in chloroform and turpentine.

CARAWAY SEED

Uses:

Substitute for carnauba and beeswax.

Substitute for montan wax as a stabilizer.

CAPRIC ACID (Decanoic Acid, Decatoic Acid, Decoic Acid, Decylic Acid)

White crystalline substance with an unpleasant odor.

Properties:

Specific gravity	0.886
Boiling point	268-270°C.
Melting point	31.5°C.
Refractive index.....	1.43 (40°C.)

Solubility:

Soluble in dilute nitric acid.

Soluble in most organic solvents.

Insoluble in water.

Uses:

Substitute for naphthenic acid in rubber compounding.

CARAWAY SEED

The caraway seeds on rye bread is being replaced by a trade-marked product called "Dill Car" seed. It is claimed to be dill seeds, shelled and impregnated with caraway oil. It is also claimed that baked in and on top of rye bread it tastes and looks like genuine imported caraway seed, but it is much cheaper.

CARBAMIDE

CARBAMIDE

See Urea.

CARBIC ANHYDRIDE RESINS

Trade name for a series of resins the basis of which is "carbic" anhydride. One of these resins (liquid type) is claimed to be heat reactive and air drying. It is used for the processing of oils and oil-resin combinations, yielding products which may be used as substitutes for tung oil in the formulation of fast drying high gloss enamels.

CARBIDE LIME

Waste product of the acetylene industry. The Germans have found a new process of cleaning it of its impurities better than has been done before this. It is used in the building industry to replace slaked lime for the preparation of mortar and for whitewash.

CARBIDE OF LIME

See Acetylene-Generator Waste.

CARBITOL LAURATE

A semi-solid wax, orange in color.

Properties:

Specific gravity0.94

Saponification value180-190

CARBITOL STEARATE

Iodine value7-8

Melting point.....19-20°C.

Solubility:

Soluble in methanol, ethanol, naphtha, acetone, ethyl acetate.

Soluble (hot) in toluene, mineral oil, cottonseed oil. ..

Insoluble in water.

Uses:

A synthetic wax possessing special properties for use in the textile industry, cosmetic industry, polishes, etc. It is also a plasticizer for nitrocellulose.

CARBITOL STEARATE

A cream colored paste.

Properties:

Specific gravity0.91

Saponification value155-165

Iodine value4-5

Melting point52-53°C.

Solubility:

Soluble (hot) in methanol, ethanol, toluene, naphtha, mineral oil, cottonseed oil, acetone, ethylacetate.

Insoluble in water.

CARBOLIC ACID

Uses:

A synthetic paste or wax possessing special properties for use in the textile industry, cosmetic industry, polishes, etc.

CARBOLIC ACID

See Phenol.

CARBON BLACK (Channel Black, Gas Black)

A black pigment which is obtained when natural gas is burned with an insufficient supply of air, for complete combustion. The liberated carbon is collected on a metallic surface.

Uses:

Printer's ink, automobile tires, rubber goods, paints and enamels, stove polishes, typewriter ribbons, phonograph records, carbon paper, crayons, glazed paper, black leather, Chinese and India inks, pyrotechnics, insulating materials, crucible steel, etc.

Substitutes:

In England it has been found that naphthalene black is an excellent substitute for carbon black in its various uses.

CARBON HEXACHLORIDE

See Carbon Trichloride.

CARBON TETRACHLORIDE

CARBON TETRACHLORIDE (Tetrachloromethane, Perchloromethane) CCl_4

A colorless non-inflammable liquid possessing a characteristic odor.

Properties:

Specific gravity1.5835

Melting point-22.95°C.

Boiling point76.74°C.

Freezing point-23°C.

Solubility:

Soluble in alcohol, ether, chloroform, benzene, benzine, most of the fixed and volatile oils.

Very slightly soluble in water.

Uses:

Substitute for oils in electrical transformers and high tension switches.

It is also used as a general solvent, as an insecticide, a delousing agent, refrigerator medium, ingredient of cleaning solutions.

Substitutes:

As a general solvent chloroform may be used in place of carbon tetrachloride, Methyl bromide may replace it as a refrigerating agent and as a solvent; methyl chloride may also replace it as a refrigerant.

Trichlorethylene is an excellent solvent for general purposes.

CARBON TRICHLORIDE

CARNAUBA WAX

CARBON TRICHLORIDE (Hexachloroethane, Perchloroethane, Carbon Hexachloride, Tetrachloroethylene Dichloride) $\text{CCl}_3.\text{CCl}_3$

Crystals which are colorless. They possess a camphor-like odor. This product is obtained when sunlight acts on chlorine and ethyl or ethylene dichloride.

Properties:

Specific gravity2.091

Melting point185°C.

Boiling point185°C.

Solubility:

Soluble in ether and alcohol.

Insoluble in water.

Uses:

Substitute for camphor in the manufacture of celluloid.

It is also used as an antiseptic, as a rubber accelerator, in the manufacture of pyrotechnics and smoke devices and as a retarding agent in fermentation.

CARBOSOL

Trade name for a hard synthetic resin belonging to the modified rosin-glycerine group or a polybasic acid type.

CARBOXIDE

Trade name for a mixture of ethylene oxide and carbon dioxide which is used

as a fumigant. It is a colorless gas.

It possess the properties of ethylene oxide for the controlling of the development of mold spores and thermophillic bacteria. It is also used as a fumigant and insecticide for moths and vermin.

CARGAU

Trade name for a casein synthetic fabric manufactured in Belgium.

CARNAUBA WAX (Brazil Wax)

Yellowish green lumps possessing an agreeable odor. These lumps are amorphous.

Properties:

Specific gravity0.995

Melting point84-86°C.

Saponification value79-84

Iodine value13.5

Refractive index1.4672

Solubility:

Soluble in ether, hot alcohol, alkalis.

Uses:

Substitute for beeswax, candles, leather finishes, varnishes, etc.

It is also used as an ingredient of compositions which are used in the manufacture of electric cables and wires, in insulating compositions, in the manufac-

CARNOFIL FIBER

CASEIN

ture of candles, in leather cleaners and dressing, in finishing linoleum, polishes, wax varnishes, enamels, lacquers, perfumes, mothproofing composition, etc.

Substitutes:

Acrawax, stroba wax, montan wax, aquamel, candelilla wax. Ozokerite.

CARNOFIL FIBER

A synthetic fiber made in Germany. It is supposed to be a protein product from the muscles of the horse and ox. It is claimed to be a substitute for catgut in surgical operations also being used for textile purpose to a limited extent. The fibers are supposed to be as fine as vegetable fibers, being cardable and spinnable either by themselves or in conjunction with wool. The dyeing properties of the or wool mixtures are as good as those of all wool and their appearances are similar.

CAROA FIBER

Trade name for a fiber obtained from a Brazilian plant. It is used in the manufacture of paper.

CARVACROL (Isopropyl-ortho-cresol, Oxycymol)

An oil which is colorless and thick.

Properties:

Boiling point233-235°C.

Uses:

Substitute for thymol as a preservative.

CARYOPHIL OIL

See Clove Oil.

CARYOPHYLLIC ACID

See Eugenol.

CASCO RESINS

Trade name for an adhesive prepared from urea-formaldehyde. It is used for hot-or cold-pressing of veneers. The resultant product is claimed to be water-proof, moldproof and stainfree.

CASEIN

A non-crystalline white to yellowish powder. It is obtained from skim milk on precipitation with hydrochloric or sulfuric acid. It is also obtained by the lactic fermentation of this milk.

Properties:

Specific gravity1.259

Solubility:

Soluble in alkalies, alkaline carbonates, acids.

CASEIN WOOL

Uses:

In coatings where casein replaces the linseed oil or other drying oils. The casein provides the sizing property and fillers provide the covering power. Substitute for gelatin, gums, shellac, and albumen. In water paints, etc.

Substitutes:

Prosein replaces casein in water paints and other coatings.

Soy bean protein has been suggested as a substitute for casein in the paper and plywood industry as an adhesive. It has also been reported that fibers made from soy bean protein are more resistant to the action of molds than casein fibers. Cellofas WLD, alpha protein, zein are additional substitutes.

CASEIN WOOL

Casein wool is similar to sheep's wool in its chemical constitution. The main difference between them is that the casein wool is lower in its sulfur content. It is claimed that the fibers are smoother. The scaly surface characteristic of real wool is said to be lacking in casein wool. Its general handle is claimed to be soft and rather similar to sheep's wool. Its specific gravity is reported to be lower, its crease resistance is the same. It is claimed to be mothproof but susceptible to the attack of certain bacteria, which actually dissolve the fiber under certain favorable conditions. Its tensile strength is less than that of real wool and boiling it in water tends to lower it still more. In the dyeing of casein wool less acid is required in the dye-bath. Its resistance to alkalis is greater than the resistance of real wool.

CASOID

It is used principally in mixtures with real wool.

CASHEW NUT SHELL LIQUID

Polymers of the oil alone, or in combination with other materials have found their way into such usages as insulating varnishes, typewriter rolls, oil and acid proof cold setting cements, industrial floor tilings, automobile brake linings.

Properties:

	Raw Oil	Treated Oil
Specific gravity	0.958	0.960
Saponification value	19.6	29.7
Iodine value	269	254
Refractive index	1.5158-1.5162	1.5212-1.5218
Acetyl value	173	156

The chemical treatment greatly reduces the irritating effects of the oil.

Uses:

It has been suggested as a fixative in perfumes.

CASOID

Trade name for a synthetic plastic resin prepared from a casein base.

CASOLANA

Trade name for a casein synthetic fiber manufactured in Holland.

CASSAVA STARCH

See Tapioca.

CAST IRON

It has been reported that cast iron pipes are being replaced by pipes made from wood stave. This applies to pipes for use above ground. Cast iron is a product of the blast furnace. It is a crude product containing about 92-94% iron with some 3% silicon, manganese, sulfur and phosphorus. It is brittle, hard and does not have the strength or elasticity of steel. It can be cast readily, however. It cannot be welded or forged.

CASTOR OIL (Ricinus Oil)

Yellow to yellowish-brown thick liquid. It is practically odorless, but it possesses a nauseating taste. It is obtained from the seeds of *Ricinus communis*.

Properties:

Specific gravity	0.960-0.970
Saponification value	178
Iodine value	85
Acid value	0.12-0.8
Refractive index	1.4771

Solubility:

Soluble in alcohol, ether, benzene, chloroform, carbon bisulfide.

Uses:

Plasticizer and softener in nitrocellulose compositions.

In hair dressings and other cosmetics.

In electrical insulating compositions.

In rubber substitutes.

Substitute for dibutyl phthalate as a plasticizer.

The plant may be used as a substitute for pyrethrum as an insecticide.

Substitutes:

Glyceryl monoricinoleate in hair dressings.

Oxidized petroleum hydrocarbon as a plasticizer.

Ground-nut oil.

Diglycol laurate S in hair tonics.

CASTOR OIL, Dehydrated

A castor oil from which has been removed about 5% of the chemically combined water. As a result of this the oil possesses drying properties similar to those of tung oil although it does not dry as rapidly as the latter. Drying oils prepared from dehydrated castor oil are used as substitutes for tung oil.

Dehydrated castor oil itself is used as a substitute for wood oil in the preparation of waterproof lacquers. It is also used as a substitute for tung oil in the preparation of waterproof paints.

CASTOR OIL

Substitutes:

Activated linseed oil.

CASTOR OIL, Sulfonated

See Turkey Red Oil.

CASTUNG

Trade name for a series of processed oils which are obtained from castor oil. When compounded with certain resins they yield substances which can be used in the manufacture of protective coatings, plastic products and ink. They can be used to replace chinawood oils but they are not considered as synthetic chinawood oils. Some of these oils are solids, others are liquid.

CATALIN

Trade name for a phenol-formaldehyde resin available in the form of rods, bars, tubes, sheets, castings. It also comes in the form of cement and bonding varnish.

Properties:

Tensile strength	3000-5000 lbs.
	/sq. in.
Flexural strength	7000-12000 lbs.
	/sq. in.
Refractive index	1.46
Specific gravity	1.30-1.33

Uses:

Buttons, buckles, toilet articles, radio cabinets, imitation jewelry. Its liquid form is used in aircraft manufacture as a bonding agent.

CEDARWOOD OIL

CATGUT

See Carnofil Fiber.

CATIVYL ALCOHOL

A comparatively new chemical compound being the alcohol corresponding to the alcohol radical of the principle ester constituent of cativo resin.

CATTAILS

It has been found that a plant known as *Typha latifolia* (cattails) yields a fiber from which a fluffy, water-resistant down can be produced. It is claimed that this down can be used as a stuffing for toys, sporting goods, upholstery, life-preservers and padding for tanks.

CATYLACETIC ACID

See Stearic Acid.

CEDARWOOD OIL

A volatile oil which is either colorless, pale yellow or greenish-yellow in color. It has a mild, agreeable odor. It is poisonous.

Properties:

Specific gravity
0.943-0.961 (15°C.)

CELASTIX

Uses:

Immersion medium in microscopy.

It is also used as a source of cedrene and cedrol, in insecticide compositions, in perfumes, as an ingredient of disinfecting soaps and as a polishing agent for fine woods.

Substitutes:

Liquid perolatum.

Naphthalene may also be used as a substitute insecticide.

CELASTINE

A natural strontium sulfate, white in color, resembling barium sulfate.

Used as a substitute for barium sulfate in the manufacture of rubber goods.

CELASTIX

Trade name for a plastic which is a double-napped flannel said to be similar to a cotton blanket, impregnated with cellulose nitrate and a fire-retardant to make it slow burning. It is claimed to be suitable for repairing broken industrial patterns of either wood or metal.

CELASTOID

Trade name for a non-inflammable material prepared from cellulose acetate. It is claimed to be a substitute for celluloid.

CELLOFAS WLD

CELLACITE

Trade name for a plastic claimed to be acid proof and to have high dielectric properties. It can be nailed, punched and will take screws.

CELLITE

Trade name for a cellulose acetate plastic claimed to be less flammable than celluloid.

CELL JUTE

A synthetic hard fiber made in Germany. It is claimed to be more elastic, more uniform and cleaner than natural jute. It is used in the manufacture of sacks for flour and sugar. It has also found use in the linoleum, cable and carpet industries.

CELLOFAS WLD

Trade name for a water-soluble cellulose derivative which forms mucilages similar to starches and gums. It is claimed to have the advantage that its solution does not ferment or develop molds and that its binding powers are superior on pigment fillers.

It may be used to replace starch as a sizing agent for cotton and rayon or as a finishing agent for cotton, linen and

CELLON

rayon piece goods. It may also be used in place of casein for many of its applications in the field of adhesives.

CELLON

A non-inflammable celluloid made in Germany.

CELLOPHANE

Trade name for an elastic, transparent, heat-resistant, gas tight cellulose film. It is claimed to be no more inflammable than ordinary newsprint.

It is insoluble in water, oil and nearly all organic solvents.

Uses:

Substitute for celluloid, gutta-percha and parchment.

For packaging and wrapping perishable items.

Substitutes:

Plastic films, parchment paper, plio-film, waxed paper, etc.

CELLOSOLVE SOLVENTS

Trade name for ethylene glycol monoethyl ether. It is a colorless liquid.

CELLULITH

Properties:

Specific gravity	0.9311
Boiling point	135.1°C.
Refractive index.....	1.4060 (25°C.)
Flash point	135°F.

Solubility:

Soluble in water, glycerin, ethylene glycol, amyl acetate, butyl acetate.

Uses:

Solvent for gums, resins, nitrocellulose.

It may also be used in the leather industry, in dyeing and printing textiles, etc.

CELLUFOAM

Trade name for a light weight thermal and acoustical insulation.

It is claimed to be useful in the insulation of refrigerator cars, trailers and portable perishable freight containers. It is also used in the manufacture of refrigeration equipment and in the heating and air conditioning industries for duct insulation.

CELLULITH

Trade name for a product prepared from paper pulp which is beaten until the fibers disappear. The mass is then boiled settled and dried. The product which results is a horny mass which resembles unvulcanized rubber.

CELLULOID

CELLULOID

Trade name for a material consisting essentially of a solid solution of cellulose nitrate and a plasticizer. It may or may not be colored. It is a synthetic nitro-cellulose plastic.

Properties:

May be clear or colored; transparent, translucent or opaque.

Specific gravity1.36-1.60

Tensile strength.....5000-10000 lbs.
/sq. in.

Dielectric constant6.7-7.3
at 60 cycles.

Solubility:

Soluble in organic solvents.

Insoluble in hydrocarbons, mineral oils, mineral acids.

Decomposed by alkalis and strong acids.

Uses:

Toilet ware, fountain pens, etc.

Substitutes:

Cellophane, cellon, cellite, celastoid.

CELLULON

Trade name for a wood pulp fiber made in Germany.

CELLULOSE ACETATE

CELLULOSE

An essential constituent of all vegetable matter. It is used by industry in the form of lumber, chips, ground, and plant fibers. It is a carbohydrate. The purest form is obtainable from cotton.

Substitutes:

It has recently been reported that a new process of obtaining cellulose from Canadian wood pulp instead of from cotton linters has been developed.

Other substitutes include bagasse and wood flour.

CELLULOSE ACETATE (Sericose)

A non-inflammable, yellowish mass which is transparent. There are three types.

Solubility:

Type A—Soluble in alcohol. Insoluble in water.

Type B—Insoluble in water.

Type C—Insoluble in water, alcohol, ether.

Uses:

Insulation for telephone wires, artificial silk, airplane dope, photographic films, plastics, rubber substitutes, rendering various articles non-flammable.

Substitutes for silk as an insulator of telephone wires, etc.

Substitutes:

Acceplus flakes.

Cinclin flakes.

CELLULOSE ACETATE RAYONS

These fibers are produced by extruding an acetone solution of cellulose acetate into warm air under carefully controlled conditions of temperature, velocity and relative humidity of the air.

The strength of these fibers compares favorably with that of wool. They are white, are soft and supple in nature and they possess good resistance to creasing and to perspiration. Since they are thermoplastic care must be exercised in ironing them, but it is possible to obtain certain valuable permanent effects in the finishing and the styling of the garment.

Cellulose acetate rayon fibers are moderately hygroscopic. They are soluble in acetone and a few other solvent mixtures and organic solvents.

They are useful for both men and women's wear and for household effects such as curtains, etc.

CELO-BLOCK

Trade name for an insulating material made from sugar-cane fiber. The fiber is pressed into blocks.

Although the material is cheap it is not as efficient or long standing as other materials used for the same purpose.

It may be used to replace cork for insulating purpose.

CELON

A German made cellulose acetate plastic. It is claimed to be much less inflammable than pyroxylin plastics.

Its use is restricted mainly to motion picture film, although the resulting film is not as strong as pyroxylin film.

CERAFLUX

Trade name for a refined paraffin wax which does not exhibit the characteristic sour odor when melted. It is claimed to be superior to paraffin wax in flexibility, adhesive power, water-resistance, and solubility in various oils.

Properties:

Melting point50-51°C.

Specific gravity0.88 (25°C.)

Solubility:

Soluble (hot) in toluene, naphtha, mineral spirits, mineral oil, vegetable oil.

Insoluble in water.

Uses:

For flexibility, adhesive power, water-resistance and solubility in certain oils.

As a substitute for ozokerite.

CEREAL STARCH

A new source of starch is maize and other cereals. The viscosity of waxes from this source is high and the gelling characteristics are low.

CERESIN

It has been suggested that this starch may be used to replace tapioca in many commercial products. It may also be used as a remoistening glue, in paper sizing, etc.

CERESIN (Purified Ozokerite, Earth Wax, Mineral Wax, Cerosin, Cerin)

Waxy, white material which is tasteless and odorless.

Properties:

Specific gravity0.92-0.94

Melting point74-80°C.

Solubility:

Soluble in alcohol, benzene, chloroform, naptha.

Insoluble in water.

Uses:

Substitute for white wax.

Candles, sizing, electrical insulations, polishes, etc.

Substitutes:

Flexo Wax C.

Ozokerite.

CERIN

See Ceresin.

CHEMIGUM

CERISE WAX

See Flexo Wax C.

CEROSIN

See Ceresin.

CEYLON GELATIN

See Agar-Agar.

CEYLON ISINGLASS

See Agar-Agar.

CEYSSATITE

See Diatomaceous earth.

CHANNEL BLACK

See Carbon Black.

CHAR

See Boneblack.

CHEMIGUM

Trade name for a synthetic material said to be a butadiene polymer. It is a synthetic rubber.

CHEMPRUF

Properties:

This synthetic rubber has high oil resistance, good flex life, abrasion is said to be slightly better than natural rubber. It is claimed to be superior to natural rubber where oil and gasoline is a factor. It stiffens under the effect of heat.

Uses:

Tire treads, gaskets, hose, belts, gas and oil tanks, etc.

CHEMPRUF

Trade name for a rubberless material which is compounded in two types. Type A is a heavy brush-on liquid. Type B is a plastic for heavy-duty service involving mechanical wear and tear.

Properties:

Melting point510°F.

Softening point300°F.

Withstands 50% solutions of nitric acid, sulfuric acid, hydrochloric acid and hydrofluoric acid. They are also resistant to saturated solutions of various caustics.

Uses:

Used to replace rubber linings in plating tanks, acid tanks, fume ducts, pipes, etc.

CHICLE

See Coumarone, para- (Resin).

CHINA WORKS MOLD OIL

CHICLE GUM (Balata, Tuno Gum, Zapota Gum)

The dried milky juice from *Mimusops globosa*. It is a grayish-white to reddish-brown solid.

Properties:

Specific gravity1.05

Softening point49°C.

Solubility:

Soluble in benzene, ether, carbon disulfide, kerosene, petroleum.

Uses:

Substitute for gutta-percha.

CHINA CLAY

See Kaolin.

CHINA OIL

See Peru Balsam.

CHINA WORKS MOLD OIL

An oil said to have properties similar to those of "transformer oil" and "summer black oil". It is claimed to be suitable for the same purpose.

CHINAWOOD OIL

CHINAWOOD OIL

See Tung Oil.

CHINESE BEAN OIL

See Soy-Bean Oil.

CHINESE GELATIN

See Agar-Agar.

CHINESE ISINGLAS

See Agar-Agar.

CHINESE WHITE

See Zinc Oxide.

CHLORINATED DIPHENYL

These are pale colored derivatives of diphenyl of varying nature from a clear colorless liquid to a yellow brittle resin. They are used as fireproof coatings and as dielectrics under the trade name of Arochlor, of which there are numerous varieties.

CHLORINATED HYDROCARBON

A mixture of the chlorides of methane, propane and ethane used as a component

CHLOROFORM

of the formula which is used to replace benzene in the preparation of paint and varnish removers.

CHLORINATED RUBBER

See Rubber, Chlorinated.

CHLORINATED SOLVENTS

These generally are liquid, chlorinated derivatives of the lower saturated and unsaturated paraffins. They are, as a rule, non-flammable. They are solvents for a wide number of organic materials, such as gums, esters, alkaloids, etc.

For the cleaning of metals other materials may be substituted for them. These materials include the following:

Alkaline detergents such as borax, caustic soda, soda ash, sodium metasilicate, trisodium phosphate, etc., combined with dresinate, which is a wetting and emulsifying agent.

CHLOROBENZAL

See Benzyl Dichloride.

CHLOROFORM (Trichloromethane, Formyl Trichloride) CHCl_3

A colorless liquid which is clear and highly refractive. It is very volatile. Chloroform may be obtained as a product of the reaction between chlorinated lime and acetone.

CHLOROMETHANE

Properties:

Specific gravity	1.49887
Boiling point	61.2°C.
Melting point	-63.2°C.
Refractive index	1.4422 (25°C.)

Solubility:

- Soluble in alcohol, ether, benzene.
- Only slightly soluble in water.

Uses:

As a general solvent in place of carbon tetrachloride.

It may also be used in medicine as an anesthetic, serum preservative, as an insecticide, etc.

CHLOROMETHANE

See Methyl Chloride.

CHLOROPICRIN

See Nitrotrichloromethane.

CHLOROTHYMOL

White crystalline substance.

Properties:

Melting point.....	62-64°C.
Phenol coefficient	120

Solubility:

Soluble in alcohol, benzene, chloroform, dilute caustic soda.

Uses:

Substitute for formaldehyde as a preservative.

CHONDRUS

See Irish Moss.

CHROMITRON

Trade name for a product which is claimed to be much better than rouge, emery and similar materials for polishing and sharpening purposes.

CHROMIUM

A steel gray metal which is infusible, hard, brittle. It does not tarnish in air.

Properties:

Specific gravity	6.92
Melting point	1615°C.
Boiling point	2200°C.

Solubility:

Soluble in acids, except nitric acid. Soluble also in strong alkalies,

Insoluble in water,

Uses:

Chromium plating; in the manufacture of stainless steel. It is a constituent of other alloys such as cast iron, low alloy steels, higher alloy steels, non-ferrous alloys.

Substitutes:

Sprayed synthetic enamels can be used as a protective metal plating on electrical housewares instead of chromium plating.

Baked enamels can be used on electric motors.

Specially prepared oxide coatings can be applied to steel or cast iron instead of chromium. Ceramic coatings and indium plating can also be used.

Nichrome wire can be conserved by changing to cast-iron grid resistors.

In some cases plastics can be used for bright metal trimmings.

Cadium finishes can be applied to replace chromium finishes in certain household appliances.

When used for linings in chemical and process industries where corrosion resistance is demanded (except in high pressure distillation like that used in oil refining), silicon iron and steel chemical stonewear can replace chromium. Glass, synthetic plastics, natural or synthetic rubber, silver, gold and platinum can also be used.

Extruded length of plastic material can be used to replace chromium used in trimming car body exteriors.

CHRYSLITE

See Olivine.

CIBARA GUM

A dark colored gum obtained in the Western hemisphere used to replace Gum Arabic in some of its uses. The adhesive properties are claimed to be excellent.

CICOLI

A type of oiticica oil which consists of an oiticica oil obtained by a process employing higher temperatures than usual. This oil remains liquid during storage and transit. If exposed to a strong light for a time it solidifies.

CINELIN FLAKES

Trade name for a cellulose acetate and cellulose nitrate product. These are reclaimed under strict chemical control. These flakes are used to replace celluloid and film scrap. It can be used wherever nitrocellulose and cellulose acetate are applicable.

CITRAL

A light yellow liquid which is found in the oils of lemon or lemongrass.

Properties:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

Flavors, perfumery and lemon extracts.

CITRIC ACID

CLINCHFIELD 500-W

Substitutes:

Lemongrass oil.

Properties:

Refractive index1.4811-1.4830

Optical rotation-5 to -21

CITRIC ACID (Oxytricarballic Acid)



Crystalline white powder or colorless, odorless crystals.

Solubility:

Soluble in alcohol, ether, chloroform.

Properties:

Specific gravity1.542

Melting point153°C.

Uses:

As an odorant or an insect bait or repellent.

Substitutes:

Jerole, andro.

Solubility:

Soluble in water, ether, alcohol.

Uses:

As a plasticizer; in food and drink products.

Substitutes:

Tributyl citrate, tributyl tricarballic acid, triethyl citrate, triethyl tricarballic acid.

Lactic acid and phosphoric acid can replace citric acid in food and drink products.

CITRONELLAL HYDRATE

See Hydroxycitronellal.

CLARITE

Trade name for an inert, synthetic resin which is water-white in color.

Uses:

As a substitute for Canada balsam it may be used for covering histological sections. It is claimed that it will not cause stains to fade and does not discolor on aging.

CITRONELLA OIL (Lana Batu, Verbena Oil)

A yellowish or greenish-yellow liquid. It possesses an agreeable odor.

CLINCHFIELD 500-W

Trade name for a China clay product which chemically is a form of aluminum

CLOVE OIL

silicate. It wets easily with most of the vegetable oils and varnishes. It is used as an extender in paints and enamels.

CLOVE OIL (Caryophil Oil)

A light yellow liquid which darkens on exposure. It possesses a strong aromatic odor. It is obtained by distillation from cloves.

Properties:

Specific gravity.....	1.048-1.070
Boiling point	250-260°C.
Refractive index	1.5301-1.5360

Solubility:

Soluble in alcohol, ether, and chloroform.

Uses:

In medicine it is used as an anesthetic.

It is also used in perfumery, confectionery and soaps.

Substitutes:

Since eugenol is the chief constituent of clove oil it may be used in place of clove oil for many of its applications.

Clovel is another substitute for this product.

Clove-stem oil may be used wherever it is permissible to use a product with an odor inferior to that of clove oil.

CLOVE-STEMS OIL

CLOVEL

Trade name for a product which resembles clove oil in odor. It is a light orange colored liquid.

Solubility:

Soluble in ethyl alcohol, castor oil and mineral oil.

Insoluble in water.

Uses:

Substitute for clove oil.

It is also used as an odorant for soaps, liniments, lubricants, etc.

CLOVE-STEMS OIL

A liquid which resembles clove oil in appearance. Its odor is less agreeable. It may be obtained by distillation of the stems of cloves.

Properties:

Specific gravity	1.040-1.067
Refractive index	1.531-1.538

Solubility:

Soluble in alcohol.

Uses:

As a substitute for clove oil where a product with inferior odor is permissible.

CM

Trade name for a fire retardant chemical. It is claimed that clothing of all kinds may be made fire resistant by dipping or spraying them with this chemical. Upon contact with fire the material may char but it will not burn. The feel or the appearance of the fabric is claimed not to be effected by this treatment.

COAL NAPHTHA

See Benzene.

COAL TAR RESINS

These are synthetic resins which are usually produced from crude coal tar naphtha within the approximate boiling range of 150-200°C. They are thermoplastic resins and range in color from faint yellow to darker shades. These coal-tar resins are available in the form of flakes, chips, or liquid. Their resistance to alkalis and acids is good.

The coal tar resins are used as binders in the manufacture of floor tiling, in rubber compounding, the formulation of varnishes, adhesives, rubber cements, etc.

COBALT Co

Pinkish, shining, hard, ductile, malleable, steel-gray metal.

Properties:

Melting point	1467°C.
Boiling point	3185°C.
Specific gravity	8.76

Solubility:

Soluble in dilute acids, slowly in hydrochloric and sulfuric, rapidly in nitric acid.

Uses:

In high speed steels of all kinds.

In permanent magnets.

Electroplating.

Substitutes:

Tantalum may be used instead of cobalt in high-speed steels and alloys. Cement carbide tools may also be used instead of cobalt in these alloys and steels.

The following may be substituted for cobalt in permanent magnets: molybdenum and tungsten-chromium-molybdenum alloys; nickel-aluminum alloys; precipitation hardened alloys of cobalt and molybdenum; various iron-nickel-aluminum alloys.

COCOA BUTTER

See Cacao Butter.

COCO-NUT BUTTER

See Coco-nut Oil.

COCO-NUT OIL (Coco-nut Palm Oil, Cocoonut Oil, Coco-nut Butter)

A lard-like, white, semi-solid fat with a characteristic odor.

COCO-NUT PALM OIL

CODUR

Properties:

Specific gravity	0.9115
Melting point	20°-28°C.
Saponification value	250-258
Iodine value	8.9

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

Butter substitute.

Manufacture of soaps, candles, cosmetics, lubricant.

As an edible oil. It may also serve as a substitute for olive oil.

Substitutes:

When used as an edible oil hydrogenated cotton seed oil may be substituted.

When used as a soapstock babassu oil, cohune oil or coyol oil may be substituted. Palm nut oil may also be used.

Soaps prepared with coco-nut oil may be replaced by petroleum soaps which are said to be prepared from superior detergents obtained from petroleum.

Tanoyl 1230 R.

COCO-NUT PALM OIL

See Coco-nut Oil.

COCOANUT OIL

See Coco-nut Oil.

COD-LIVER OIL (Morrhua Oil)

Yellow to reddish liquid. It possesses a characteristic odor. It is extracted from the livers of the codfish.

Properties:

Specific gravity	0.922-0.930
Saponification value	182-189
Iodine value	141-159
Acid value	204-207

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

An important source of vitamins A and D.

Inferior grades are used in leather and chamois dressing.

Substitutes:

Sardine oil.

Shark liver oil.

CODUR

Trade name for synthetic baking enamels made from an alkyd and urea-formaldehyde base.

COFFEE

A great number of substitutes have been used instead of coffee when the true product has been difficult or impossible to obtain. Dried beans and peas, roasted roots of parsnips, turnips, beets and dandelions, ground date stones, seeds of the canna and broom plants, cereals, chicory, roasted acorns, okra and gumbo seeds have all been roasted and used instead of coffee.

There is nothing new about using cereals as coffee stretchers and substitutes. Postum is not a substitute coffee but a cereal beverage.

COHUNE OIL (Cohune-nut Oil, Cahoun Oil, Cahune Oil, Corozo-nut Oil)

A fixed semi-liquid fat, yellowish in color expressed from the cohune nut.

Properties:

Melting point18-20°C.

Saponification value253.9

Iodine value129-13.6

Solubility:

Soluble in ether and benzene.

Insoluble in water.

Uses:

Substitute for coco-nut oil in cooking and as a soapstock.

Substitute for palm oil as a soapstock

COHUNE-NUT OIL

See Cohune Oil.

COIR

Fibers obtained from the coco-nut shell. They are used as fillers in the manufacture of rope.

COLEMANITE (Neocolemanite) $\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$

A hydrated calcium borate, white or colorless with a vitreous to dull luster.

Properties:

Specific gravity2.26-2.48

Uses:

It is found in California and is the chief raw material in the United States for the production of borax, boric acid, etc.

COLLOIDAL CLAY

See Bentonite.

COLORESIN

Trade name for a methyl cellulose adhesive.

COLUMBIAN SPIRITS

See Methyl Alcohol.

CONJULIN

Trade name for linseed oil which possesses a conjugated double bond. It is claimed to be a substitute for tung oil.

CONJUSOY

Trade name for a drying oil obtained from the molecular rearrangement of soybean oil.

CONVEYOR BELT

A new type of conveyor belt which uses steel cables in place of the customary cords or fabrics. This has been found to be very practical and useful.

COPAL (Copal Resin, Anime, Kauris, Cowrie)

A group of hard resins, yellowish to yellowish-brown in color. They are odorless and tasteless and they are obtained as the exudations of various trees.

Solubility:

Soluble in oil of turpentine and linseed oil. Hard copals are almost insoluble in the usual solvents. Soft copals are partly soluble in alcohol, chloroform and glacial acetic acid.

Uses:

As amber substitutes.

Substitutes:

Ester Gums.

COPAL RESIN

See Copal.

COPPER Cu

A hard metal, reddish, lustrous, flexible, ductile, malleable. It is sometimes found in the native state.

Properties:

Specific gravity8.96

Melting point1083°C.

Boiling point2310°C.

Solubility:

Soluble in hot concentrated sulfuric acid, hot concentrated nitric acid and dilute nitric acid. Slightly soluble in dilute sulfuric acid, ammonium hydroxide and organic acids. Very slightly soluble in hydrochloric acid.

Insoluble in water, cold concentrated nitric acid, and alcohol.

Uses:

In electrical conductors.

In hardware and building material.

In roofing materials.

In coating materials.

Copper tubings for oil lines.

As metal linings for Bird screen vats.

A substitute for monel metal for screen plates.

Substitutes:

Silver is a suitable metal in place of copper for electrical conductors.

In hardware and building materials copper may be replaced by cast iron, wrought steel, malleable iron, plastics, pottery, wood, glass.

In roofing materials copper may be replaced by sheet asbestos board or shingles.

Silver may also replace copper in coating materials.

Saran plastic tubing is suggested for use on oil lines in place of copper tubing. It has been suggested that Aceto-Butyrate tubing may be used in place of copper tubing. This special tubing is extruded out of a special formulation of Tennessee Eastman Tenite II plastic.

It has been suggested that copper can be conserved by shifting to brass where either will serve the purpose. Freight car bearings can be redesigned to use a thinly lined steel which would release large amounts of copper for other more vital uses. The search for copper substitutes reduces itself almost entirely to a search for the most economical utilization of the very smallest quantity of copper that will serve the purpose. In cases where copper has been used for non-conductor applications it has been replaced by steel, malleable iron, terne plate, brass, bronze and zinc.

In house gutters wood has been used to replace copper.

In the lining of hot water tanks enameling has replaced the copper.

In piping and plumbing lead has replaced copper.

Flashlight cases, formerly made of copper are now made of plastics.

Copper wires are being replaced by cadmium plate on steel.

The copper sheets used in the linings of vats are being replaced by Masonite.

COPPER MONOXIDE

See Copper Oxide.

COPPER OXIDE (Cupric Oxide, Copper Monoxide) CuO

Brownish-black, amorphous powder.

Properties:

Specific gravity6.32

Melting point1064°C.

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

In the control of plant mildew.

Substitutes:

Salicylates, especially bismuth subsalicylate suspended with sodium dioctylsulfosuccinate, and benzyl salicylate.

COPPER SALTS

CORK

COPPER SALTS

Copper salts are used as fungicides. They can be replaced by the use of ferric-dimethyl dithiocarbamate, phenothiazin, salicylates, tetramethylthiourea disulfide.

COPPER TUBING

See Aceto Butyrate Tubing.

CORDURA FIBER

A synthetic fiber claimed to be a rayon made by the stretch spinning method.

COREX

A phosphate glass claimed to have a transmission practically equal to that of quartz glass, but it is not completely resistant to atmospheric moisture.

CORK

The bark of the variety of oak tree known as cork-oak. It is imported mainly from northern Africa. It is light and porous.

Properties:

As filler, stoppers, insulation, sound insulation, life preservers, gaskets, etc.

Substitutes:

Metal and paper replace it when it is used in automobile gaskets.

Rubber derivatives and plastics replace cork when it is used in bottle caps.

The bark of the Pau Santo and several other trees in Brazil resemble corkwood in appearance and properties.

When used in flotation devices it can be replaced by cellular rubber. This cellular rubber is a synthetic product of light weight and water-resistant. Kapok and balsa wood can also be used.

Cork in insulation products may be replaced by mineral wool, fiberboard, asbestos, glass wools, rock wool or plastics.

Cork in linoleum is replaced by wood flour.

Cork in composition products can be replaced by leather and metal and rubber, and rubber composition products.

The recent northern Africa campaign releases large quantities of cork which has been awaiting shipment.

The shredded bark of the American redwood tree is proving an excellent insulation material. It is cheaper than corkboard.

Corkboards used in the insulation of cold-storage warehouses, roofs, etc. are being replaced by Fiberglas (asphalt enclosed) Board made of spun glass.

The fibers remaining after the sugar-juices have been squeezed out of the sugar cane stalks are used for insulation purposes in place of cork. It has the ability to keep out heat and is claimed to be equal to corkboard. It is cheaper and stronger, however. The product is resistant to moisture.

Foamglas is a product which may be used in place of cork for many purposes.

CORN OIL

CORN OIL (Maize Oil)

A pale yellow liquid with a characteristic taste.

Properties:

Specific gravity0.920-0.025

Saponification value183-193

Iodine value111-123

Solubility:

Soluble in ether, chloroform, amyl acetate, benzene, and carbon bisulfide.

Uses:

In rubber substitutes and lard substitutes.

Substitute for edible olive oil.

CO-RO-LITE

Trade name for a Durez-resin-impregnated sisal fiber. A low density is obtainable with this plastic, yielding a product comparable to wood in this effect. It is claimed to be especially valuable where substitution for wood by a plastic composition of high toughness in all directions is desirable, but where an increase in weight is not desirable.

It is used in the construction of aircraft.

COROZO-NUT OIL

See Cohune Oil

CORRUGATED ASPHALT SIDING

CORPOLIN

Colorless, odorless, oily, heavy liquid.

Solubility:

Miscible with water.

This material is almost twice as hygroscopic as glycerin. It is non-volatile, non-flammable.

Uses:

As a substitute for glycerin as a hygroscopic agent.

CORROSOL NO. 26

Trade name for a material claimed to clean metals and to prevent the growth of corrosion after treatment. It is said that the metal is left in a clean, passive state. It is further claimed that it does not act on the metal itself and that it does not dull the cutting edge of tools as does ordinary pickling baths. Not only does it remove rust but it eliminates blemishes, etc.

CORRUGATED ASPHALT SIDING

A product developed to replace corrugated steel on temporary structures of all kinds. It consists of two sheets of heavy rag felt saturated with a resinous-bituminous compound and pressed together with a high melting asphalt adhesive. The product which is formed is claimed to retain its stiffness and moisture resistance in all kinds of weather.

COSMETIC BISMUTH

COSMETIC BISMUTH

See Bismuth Oxychloride.

COTTON CORD

The cotton cord in the carcass of the endless belts of one manufacturer is replaced by flexible steel wires. It is claimed that it can withstand the heat and strain developed by the engines of military tanks and armored vehicles.

The cotton fabric used for the same purpose is also replaceable by these flexible steel wires with the same results.

COTTON, GREEN

It has recently be reported that green cotton yields a much greater percentage of waxes than does the ordinary white variety. This new source of wax may prove of great importance to the manufacturer of polishes for floors, furniture, automobiles, etc. The farmer should also be benefited by this new market for his product.

COTTON LINTERS

Canada is rapidly attaining self-sufficiency in cotton linters. Canadian wood pulp is being utilized as a source of cellulose in place of the imported cotton linters which was previously obtained from the United States.

COTTONSEED OIL

COTTONSEED MEAL

This is the product obtained after the oil is extracted from the cottonseed. It contains from 7-9% ammonia, 2-3% phosphoric acid, 1.5-2% potash.

When substituted for an inert filler it increases the flow of phenolic compounds. It also increases the water absorption.

Compounds containing equal parts of phenolic resins, cottonseed hulls and cottonseed meal reduce the raw material cost 25% as compared to 50-50 resin: filler compounds. At temperatures between 320° and 360° F. the flow and cure-time properties are favorable.

COTTONSEED OIL (Seed Oil, Cottonseed Stearno)

A fixed, non-drying oil obtained from the seeds of the cotton plant. It is pale yellow or yellowish-brown to dark red in color depending on the source.

Properties:

Specific gravity0.922-0.930

Melting point34-40°C.

Saponification value191-196

Iodine value101-116

Solubility:

Soluble in ether, benzene, chloroform, carbon bisulfide.

Insoluble in alcohol.

COTTONSEED STEARNO

Uses:

When hydrogenated it may be used as a substitute for coco-nut oil.

In butter substitutes.

When in the solid state it may be used as a substitute for lard.

Substitute for edible olive oil.

When hydrogenated cottonseed oil may also be used as a substitute for palm oil in the finishing of tin plate.

Substitutes:

Soy-bean oil.

COTTONSEED STEARNO

See Cottonseed Oil.

COUMARONE, P A R A (Cumarone Resin, Benzofurane Resin, Indene)

A lemon yellow to brownish-red resinous body. It is a mixture of para-coumarone, para-indene, metastyrene and other components depending on the source.

Properties:

Specific gravity1.05-1.10

Melting point45-200°C.
depending upon the source

Boiling point
Decomposes at 250°C.

CREMNITZ WHITE

Solubility:

Soluble in ether, coal-tar and petroleum solvents, turpentine, pyridine, acetone, carbon bisulfide, carbon tetrachloride.

Insoluble in water and alcohol.

Uses:

Substitute for chicle in chewing gum.

COWRIE

See Copal.

COYOL OIL

An oil obtained from a tropical palm

Uses:

Substitute for palm oil as a soapstock.

Substitute for coconut oil.

CREAM OF TARTAR

See Potassium Bitartrate.

CREMNITZ WHITE (Kremnitz White, Creams White, Krems White, Flake White, Silver White, Blanc d'Argent, London White)

A series of pigments consisting of basic lead carbonate and hydrated lead oxide. The pigments differ from each other mainly in the amount of lead oxide they contain. Bismuth subnitrate sometimes goes under the name of flake white.

CREMS WHITE

CREMS WHITE

See Cremnitz White.

CRESOL, ORTHO (Cresyl Alcohol, Ortho-cresylic acid, Ortho-oxytoluene, Ortho-methylphenol, Ortho-kresol) $\text{CH}_3\text{C}_6\text{H}_4\text{OH}$

Poisonous white crystals. It possesses a phenolic odor.

Properties:

Specific gravity1.05

Melting point30.4°C.

Boiling point191°C.

Solubility:

Slightly soluble in water.

Soluble in alcohol, ether, chloroform.

Uses:

Gum inhibitor in cracked gasoline.

It is also used as a disinfectant.

Substitutes:

Mesitol.

CRESYL ALCOHOL

See Cresol, Ortho.

CRYOLITH

CRYOLITE (Cryolith, Kryolith, Greenland Spar, Ice Stone)

A natural fluoride of sodium and aluminum mined only in Greenland. We are 100% dependent upon imports for this material. Its usual color is snow-white to colorless.

The aluminum industry is the principal user of this material. It is a solvent for bauxite in the electrolytic process for the manufacture of aluminum. The ceramic industry is also an important user of cryolite. It serves as an opaque glass base which resembles porcelain.

Artificial cryolite and synthetic resins are being used successfully to replace cryolite for its many uses.

As a raw material in the manufacture of ceramic ware sodium silicofluoride can replace cryolite.

Cryolite may be used as a substitute for rotenone as a stomach-poison insecticide.

CRYOLITE (Na_3AlF_6) Synthetic

White powder which is obtained when soluble soda and alumina salts are treated with hydrofluoric acid.

Solubility:

Insoluble in water.

Uses:

Substitute for rotenone as an insecticide

CRYOLITH

See Cryolite.

CRYSTALITE

CRYSTALITE

Trade name for an acrylic resin thermoplastic molding powder which is available in a number of colors and forms for compression or injection molding.

Properties:

Specific gravity1.18-1.19

Refractive index1.488-1.489

Tensile strength
4000-6000 lbs./sq. in.

Flexural strength
10000-15000 lbs./sq. in.

Coefficient of expansion
8-9 x 10-5/Oc.

Impact resistance1-4 ft. lb.

This resin is unaffected by most chemicals and solvents. Its electrical and physical properties are excellent. It is claimed that it does not warp nor lose its colorless transparency. It is said to be more resistant to breakage than is glass.

Uses:

Edge-lighted radio and automobile dials.

Crystal-like ornaments, artificial jewels, brush-backs, cosmetic containers, nameplates, gauge glasses, goggle lenses, fountain pens, dishes, sign letters.

CRYSTALOX

Trade name for an acrylic resin used for dental devices. It is a methacrylate resin, available in transparent and mottled-gum-pink colors.

CUMIC ACID

CUMAR

Trade name for a resin which is derived from coumarone and indene and homologous compounds. It is available in forms ranging from a viscous liquid to a solid. It is stable with a characteristic mild odor.

Properties:

Specific gravity1.05-1.15

Melting point
5-140°C. depending on the grade

Solubility:

Disperses readily in rubber.

Insoluble in methyl and ethyl alcohol.

Soluble in most common solvents.

Is miscible with nearly all vegetable oils except castor oil and oleic acid.

It is neutral, and waterproof.

Resists mild acids and alkalis.

Uses:

Printing inks, waterproof adhesives, mastic floors, varnishes, tires, inner tubes, etc.

CUMARON RESIN

See Coumarone, Para.

CUMIC ACID

Colorless crystals.

CUPRIC OXIDE

CYSTOGEN

Properties:

Melting point116.5°C.

Solubility:

Soluble in alcohol and ether.

Slightly soluble in water.

Uses:

A substitute for benzoic acid in its various technical applications.

CUPRIC OXIDE

See Copper oxide.

CYANAMIDE

See Calcium Cyanamide.

CYDONIA (Quince Seed)

A seed obtained from *Cydonia vulgaris* found in Southern Asia and Europe.

Uses:

In lotions and hair dressings.

Substitutes:

Alginates.

Irish moss.

Pectins.

CYSTOGEN

See Hexamine.

D

DAMAR GUM

See Dammar Gum

DAMAR RESIN

See Dammar Gum.

DAMMAR GUM (Damar Gum, Damar Resin)

Yellowish-white amorphous masses obtained as a resinous exudation from the *Shorea wiesneri* found in the East Indies and the Philippines.

Properties:

Specific gravity1.04-1.12

Melting point120°C.

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide, concentrated sulfuric acid, oil of turpentine.

Uses:

As a mounting medium in microscopy.

Substitutes:

Clarite.

Ester Gums.

DATURINE

See Atropine.

DECAHYDRONAPHTHALENE

See Dekaline.

DECALIN

See Dekalin.

DECANOIC ACID

See Capric Acid.

DECATOIC ACID

See Capric Acid.

DECOIC ACID

See Capric Acid.

DECYLIC ACID

See Capric Acid.

DEGRAS (Sod Oil, Wool Grease)

Dark brown fat with a disagreeable odor. It is obtained by washing sheep's wool.

Solubility:

Soluble in alcohol, benzene, ether.

Uses:

Leather stuffing, lanolin production, printing inks, soaps, varnishes.

Substitutes:

Sublan.

DEKALIN (Decahydronaphthalene, Decalin, Kelalin) $C_{10}H_{18}$

Colorless, saturated, aromatic hydrocarbon liquid.

Properties:

Specific gravity0.877-(20°C.)

Boiling point189-191°C.

Refractive index1.4815

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

It is sometimes used as a substitute for turpentine and turpentine oil.

DERRIS

The leaves of the plant *Derris uliginosa* which is usually found in the South Sea Islands. It contains tubatoxin which is poisonous for lower animals but not for human beings. It is thus an excellent insecticide.

Used as a source of rotenone.

Substitutes:

Devil's shoestring.

Thanite.

DEVIL'S APPLE

See Stramonium.

DEXTRIN (British Gum, Gommeline, Starch Gum, Artificial Gum, Vegetable Gum, Leiocom, Sago Dextrin, Tapioca Dextrin)

A yellowish or white amorphous solid, obtained by heating dry starch.

Solubility:

Soluble in water.

Insoluble in alcohol and ether.

Uses:

As a substitute for gum tragacanth and gum arabic.

Substitute for gelatin in various technical applications.

DEXTRO-TARTARIC ACID

DIAX

Substitute for gum arabic in some of its uses.

Sizing agent.

Adhesives.

In hair dressing and other cosmetics.

Substitutes:

Algin preparations may be used as substitutes for this material as a sizing agent. Soybean phosphatides and soybean lecithin may both be used for the same purpose.

When used for adhesives, sweet potato starch may substitute for dextrin.

Solvitex may serve as a substitute in the printing of textile fabrics.

It has been suggested that Abopon is an excellent substitute for vegetable gums in hair dressing and other cosmetics.

In the manufacture of paints and adhesives and in the textile industry sodium cellulose glycolate may be used instead of vegetable gum.

DEXTRO-TARTARIC ACID

See Tartaric Acid.

DIASTAFOR

See Diastase, Malt.

DIASTASE, MALT, (Diax, Diastafor, Special Diamalt, Amylase)

A yellow amorphous powder or liquid obtained from the mash of malted grain.

Solubility:

Soluble in water.

Slightly soluble in alcohol.

Uses:

Desizing of textile materials.

Substitutes:

Solvamyl.

DIATOMACEOUS EARTH (Kieselguhr; Guhr; Infusorial earth; Fossil flour; Tripolite; Ceyssatite; Tellurine; Terra silicea)

A white amorphous powder made up of the skeletons of small aquatic plants known as diatoms.

Properties:

Specific gravity0.24-0.34

Solubility:

Soluble in hydrochloric acid.

This material is very light and very porous.

It can take up four times its weight of water. It is a poor conductor of heat, sound and electricity.

Uses:

As a clarifier it is used as a substitute for activated carbon.

DIAX

See Diastase, Malt.

DIBUTYL PHTHALATE

DIBUTYL PHTHALATE $\text{C}_6\text{H}_4(\text{COOC}_4\text{H}_9)_2$

Colorless, oily liquid. It is stable, non-volatile, non-toxic.

Properties:

Specific gravity 1.046-1.050 (20°C.)

Flash point158-174°C.

Refractive index1.489 (20°C.)

Solubility:

Miscible with most common organic solvents.

Slightly soluble in water.

Uses:

As a plasticier.

It may also be used as a solvent for perfume oils, perfume fixative, in the manufacture of safety glass, as a textile lubricating agent, etc.

Substitutes:

Butyl oleate, butyl stearate, dichloroethyl phosphate, monoglycollin, castor oil, glaurin, dipolymer oil.

DIBUTYL TARTRATE $(\text{COOC}_4\text{H}_9)_2$
 $(\text{CHOH})_2$

A colorless liquid.

Properties:

Melting point21°C.

Boiling point204°C. (approx.)

Refractive index.....1.4463 (20°C.)

Flash point132.2°C.

DICHLOROBENZENE

Solubility:

Soluble in alcohol and ether.

Uses:

As a plasticizer for plastics and lacquers it may be used in place of camphor. In the manufacture of films it also replaces camphor.

It is also used as a solvent for nitro-cellulose, etc.

DICHLOROBENZENE, ORTHO (Ortho-dichlorobenzene, Orthene) $\text{C}_6\text{H}_4\text{Cl}_2$

Colorless, heavy liquid with a pleasant, aromatic odor.

Properties:

Specific gravity1.305 (25°C.)

Boiling range178-180.5°C.

Solubility:

Miscible with most organic solvents.

Insoluble in water.

Uses:

Substitute for pyrethrum as an insecticide.

DICHLOROBENZENE, PARA $\text{C}_6\text{H}_4\text{Cl}_2$

White crystalline powder which is volatile. It possesses a characteristic penetrating odor.

DICHLOROETHYL PHOSPHATE

Properties:

Specific gravity1.2675
Boiling point173.7°C.
Melting point53°C.

Solubility:

Soluble in alcohol, ether, benzene.
Insoluble in water.

Uses:

A substitute for camphor in mothproofing compositions.

DICHLOROETHYL PHOSPHATE

See Dibutyl phthalate.

DIETHYL PHTHALATE $C_6H_4(COOC_2H_5)_2$

Water-white liquid which is stable, odorless, non-inflammable. It has a bitter taste.

Properties:

Melting point-40.5°C.
Refractive index1.5019 (20°C.)
Surface tension
37.5 dynes per cm. (20°C.)
Flash point325°F.

Solubility:

Miscible with alcohols, ketones, esters, aromatic hydrocarbons.

DIGYCOL LAURATE

Partly miscible with aliphatic solvents.

Uses:

As a substitute for camphor.

DIETHYLENE GLYCOL MONOLAU- RATE

See Diglycol Laurate S.

DIETHYLENE GLYCOL STEARATE

See Diglycol Stearate S.

DIGLYCOL LAURATE S (Diethylene Glycol Monolaurate)

Trade name for a light straw colored oily liquid possesses a very faint odor.

Properties:

Specific gravity
0.963-0.968 (25°C.)
Boiling point240-325°C.
Iodine value9-11
pH
9.0-9.2 (5% aqueous dispersion)

Solubility:

Soluble in alcohol, hydrocarbons, oils.
Dispersible in water.

DIGLYCOL STEARATE

Uses:

Substitute for castor oil in hair tonics.

Substitute for sulfonated oils in the treatment of furs.

Substitute for olive oil in various technical applications.

DIGLYCOL STEARATE S (Diethylene Glycol Stearate)

A white waxy solid with a faint fatty odor.

Properties:

Melting point51-54°C.

Specific gravity0.96

pH6.5-6.8

Solubility:

Soluble (hot) in alcohol, hydrocarbons, oils.

Disperses in hot water.

Uses:

Substitute for vegetable gums in many cases as a thickening agent.

A 1% dispersion in water is much cheaper than a wax lubricant in tin stamping.

DIHYDROXYSUCCINIC ACID

See Tartaric Acid.

DIMETHYL

DIKETENE (Vinylaceto-B-lactone) $C_4H_4O_2$

A colorless liquid which is non-hygrosopic. It possesses a pungent odor and it readily polymerizes when it is allowed to stand.

Properties:

Specific gravity1.0897

Boiling point127.4°C.

Melting point-6.5°C.

Solubility:

Soluble in organic solvents.

Insoluble in water.

Uses:

New source of acetoacetic esters, acetoacetanilide, phenylmethylpyrazolones, benzoylacetone, dehydroacetic acid.

It may be polymerized to ketene.

DILL-CAR SEED

Trade name for a product claimed to be a cheap substitute for caraway seed. It is said to be dill seed, shelled and impregnated with caraway oil.

DIMETHYL

See Ethane.

DIMETHYLANILINE

DIIMETHYLANILINE $C_6H_5N(CH_3)_2$

A yellow liquid.

Properties:

Specific gravity0.958 (20°C.)

Melting point2.5°C.

Boiling point192.5-193.5°C.

Solubility:

Soluble in alcohol and ether.

Very slightly soluble in water.

Uses:

Preparation of dyes.

Substitutes:

Phenyldiethanolamine.

DIMETHYLCARBINOL

See Isopropyl Alcohol.

DIMETHYLMETHANE

See Propane.

DIMETHYLTOLYLCARBINOL

A tertiary alcohol produced by the controlled catalytic liquid-phase oxygenation of cymene.

DIOCTYL AMINE

Properties:

Specific gravityapprox. 1.52

Pleasant odor.

Excellent wetting properties.

Uses:

It may readily be substituted for pine oil wherever a high alcohol content is required.

DINITROBENZENE $C_6H_4(NO_2)_2$

Yellow crystalline material which is available in three forms, ortho, meta and para.

Solubility:

Soluble in alcohol, benzene.

Insoluble in water.

Uses:

A camphor substitute in the production of celluloid.

DIOCTYL AMINE $(C_8H_{17})_2NH$

A water white liquid with a slight ammonical odor.

Properties:

Specific gravity0.8062 (20°C.)

Boiling point281.8°C.

DIPENTENE

Solubility:

Soluble in hydrocarbon solvents.

Insoluble in water.

Uses:

Since it is an excellent insecticide it appears to be useful as a substitute for pyrethrum.

DIPENTENE (Cinene, Cajeputene, Kautschin) $C_{10}H_{16}$

A colorless liquid possessing a lemon-like odor.

Properties:

Specific gravity0.847 (15°C.)

Boiling point175-176°C.

Flash point43°C.

Solubility:

Miscible with alcohol.

Insoluble in water.

Uses:

Substitute for turpentine and petroleum solvents in floor waxes and furniture polishes.

DIPHENYLKETONE

See Benzophenone.

DISCO TAR

DIPILYMER OIL

See Dibutyl Phthalate.

DIPPING ACID

See Sulfuric Acid.

DIPOLYMER OIL

See Dibutyl Phthalate.

DISCO

Tradename for a solid smokeless fuel obtained from bituminous coal by continuous low-temperature carbonization. It is claimed that any bituminous coal with a certain minimum of coking property that becomes plastic can be converted into Disco.

The product contains 16% volatile matter. It is claimed to be smokeless, easily ignited, is free burning and possesses a firm dense structure.

DISCO TAR

Trade name for a principal by-product of the Disco process.

It is claimed that Disco tar is characterized by its low specific gravity, its high viscosity, its high softening point, high tar acid content and its low bitumen content.

The tar obtained in this process is said to be water resistant, acid and alkali resistant. It is not resistant to the alkali hydroxides however.

DISPOSALL

Uses:

Road tars, wood preservatives, roofing pitch, disinfectant oil and orchard insecticide oils.

DISPOSALL

A household garbage-disposal unit which was formerly manufactured from aluminum is now made from steel.

DIURETIC SALTS

See Potassium Acetate.

DIVALE

See Belladonna.

DOBOLINE OIL

Trade name for a product which is 9:11 octadecadienic triglyceride. It is a dehydrated castor oil.

It is claimed to be a substitute for tung oil.

DOLOMITE

A type of rock which is a double salt of calcium and magnesium carbonates corresponding to the formula $\text{CaCO}_3, \text{MgCO}_3$.

DRIERITE

The character of this rock is indefinite. It may be a mixture of calcite, carbonates of iron and manganese, iron oxide and iron hydroxide, quartz and dolomite spar, and argillaceous matter.

Uses:

A substitute for magnesite in the manufacture of basic linings for furnaces.

DOUCIL

Trade name for a sodium-alumino-silicate which is white in color and semi-transparent. It is available in two grades depending upon the mesh.

Uses:

A substitute for calcium chloride in the purification of water.

DRIERITE

Trade name for a form of anhydrous calcium sulfate. It is highly porous and possesses an especially strong affinity for water. It is a white, neutral, stable powder.

It is not poisonous, does not deliquesce, does not disintegrate, and is non-corrosive.

Uses:

Drying of solids, liquids and gases.

Substitute for calcium chloride as a drying agent.

DROP BLACK

DUREX

DROP BLACK

See Boneblack.

DRY ICE

Tradename for solid carbon dioxide gas.

Uses:

Refrigeration, testing of panels coated with finishes to determine their reaction at low temperatures, etc.

DULCIN (Para-phenetolucarbamide, Sucrol) $\text{CONH}_2/\text{NHC}_6\text{H}_4\text{OC}_2\text{H}_5$

A white powder or crystalline needles. Its taste is about 200 times sweeter than sugar.

Properties:

Melting point173-174°C.

Solubility:

Soluble in alcohol and ether.

Moderately soluble in hot water.

Uses:

Sugar substitute.

DUPONOL

Trade name of a series of alcohol sulfates. They are used as emulsifying and dispersing agents and are use-

ful in the preparations of stable emulsions. The emulsions of solvents and oils prepared with the aid of these sulfates may be used in furniture and automobile polishes. It is claimed by the manufacturer that these emulsifying agents are satisfactory for the preparation of emulsions of waxes and resins which may be used for polishing and finishing compositions, for textiles sizes, etc. They are said to be resistant to the action of acids, alkalies and electrolytes. They are also stable to heating and freezing.

DURATILE

This material is a simulated tiling whose main constituent is tempered pressed wood made of oil treated steam-burst wood fiber, molded into stone-hard boards under terrific pressure.

It is claimed that this tiling is extremely strong. It is unaffected under the impact of a steel hammer. It is unaffected by water and temperature changes do not cause checking.

Uses:

For general utility tiling in the home. It is said to be replacing enamelled sheet metal in the manufacture of commercial signs. It is also used in the manufacture of serving trays, which are impervious to boiling water, alcohol, etc.

DUREX

Trade name for a series of synthetic resins which are soluble in oil. They are of the 100% phenolic and terpene phenolic type having a wide range of chemical and physical properties.

DUREX RESINS

Uses:

Soft drying oils.

High-melting modified phenolic resins floor varnishes and very rapid drying and durable varnishes, in floor trim and linoleum varnishes.

Printing ink vehicles and felt base flooring print paints.

It gives a good bond between the metal and a finish coat of lacquer in primers for non-ferrous alloys.

DUREZ RESINS

Trade name for a series of phenol-formaldehyde resins which are hard and brittle and marketed in both powdered and liquid form.

Properties:

These resins are claimed to be unaffected by nitric and sulfuric acids in the concentrated form. They are etched by strong sodium hydroxide. In general they are extremely resistant to chemicals. They are also claimed to be non-conductors of electricity. Most of them are thermosetting.

Solubility:

Insoluble in all organic solvents, acids and mild alkalis.

Uses:

Bonding agents for plywood, rock wool, brake linings and clutch facings, carbon brushes, iron cores, grinding wheels, flexible abrasive discs, surfacing sand cores and sealing porous metal castings. They

DURITE

are also used in the paint, varnish and printing ink industries.

DURIRON

Trade name for a high silicon iron alloy which contains approximately 14.5% silicon. It is claimed to be highly resistant to nearly all types of corrosives. It is very hard, resists abrasion and scouring.

Duriron can be used to make almost any piece of apparatus that can be made from cast iron.

DURITE

Trade name for a synthetic resin of the pure phenolic type. These resins are available in three forms, powder, lumps and liquid.

Properties:

Melting point93°C.

Tensile strength
5000-10000 lbs./sq. in.

Flexural strength
8000-20000 lbs./sq. in.

Solubility:

Soluble in all the aromatic hydrocarbons and alcohols.

Uses:

Automobile ignition parts, telephones, radio cases, motor housings, bottle and tube caps, containers, electric switches, plugs, wall plates, etc.

Substitute for Babbitt metal.

DURLAC**DWARF ALMOND FATTY OIL****DURLAC***Properties:*

Trade name for a special phenol-formaldehyde resin which may be used as a substitute for shellac.

Specific gravity0.915

Refractive index1.4714

Saponification value190.3

Iodine value104.6

Acid value0.4

DUTCH METAL

A gold leaf imitation which is cheap and made of alloy of copper and zinc.

DWARF ALMOND FATTY OIL*Uses:*

An oil similar to genuine almond oil. Obtained from the dwarf almond.

Substitute for almond oil.

E

EARTH WAX

EARTH WAX

See Ceresin.

EARTH-NUT OIL

See Peanut Oil.

EASTMAN ACETATE SHEETING

A clear transparent plastic manufactured in thicknesses from 0.003" to 0.020". It is supplied in the sheet or the roll form.

Uses:

It is claimed to be a substitute for critical materials in sound recording. It is also useful as a replacement for glass in gas masks and other goggles. It can replace rubber for the insulation of wires and cables in aircraft and armored cars and tanks. It makes an effective lining in cardboard containers in combination with waxes. In this connection it may replace tin used in the distribution of fats.

EGG OIL

See Egg Yolk.

EGG WHITE

In food products.

Replaced by Agar-agar.

ESSENCE OF MYRBANE

EGG YOLK (Egg Oil)

Obtained from the eggs of hens, ducks and geese.

Uses:

In the manufacture of ice cream, candies and similar food products.

Substitutes:

Soybean.

Lecithin.

EMERY

An impure variety of corundum. It is used primarily as a polishing and abrasive agent.

It has been claimed that a product named "Chromitron" is superior to emery for the same purposes.

ERINOID

See Galalith.

ESSENCE OF MIRBANE

See Nitrobenzene.

ESSENCE OF MYRBANE

See Nitrobenzene.

ESSOTANE

See Pyrofax.

ESTER GUMS

These are hard synthetic resins, generally the glycerol ester of rosin acids. They are produced by the esterification of rosin with glycerin.

Solubility:

Soluble in amyl acetate, turpentine, carbon tetrachloride, and some oils.

Insoluble in water.

Uses:

Substitutes for copal, damar, and kauri gums in the manufacture of enamels, paints and cellulose lacquers. They are also used in combination with tung oil in the manufacture of water-proof varnishes.

ETHANAL

See Acetaldehyde.

ETHANE (Bimethyl, Dimethyl, Ethyl Hydride, Methylmethane) C_2H_6

A colorless, odorless, flammable gas which is slightly heavier than air. It is relatively inactive chemically.

Properties:

Boiling point-88.3°O.

Melting point-172°O.

Heat of combustion22300 b.t.
u./lb. (approx.)

Uses:

Fuel for lighter-than-aircraft.

Refrigerant for very low-temperature refrigerating systems.

ETHOCEL

Trade name for ethyl cellulose resin which is thermoplastic. It is available in the form of white, porous granules that produce lacquers which are characterized by their flexibility, low burning rate, and light and heat stability.

Properties:

It is claimed that it is not affected by water, strong or weak alkalies and that it is resistant to weak acids, sunlight or age.

Solubility:

Soluble in organic solvents.

Uses:

High tension cable coatings.

Recording lacquers.

Textile and paper finishing and sizing.

Decorative items.

Packaging and wrapping.

Molded or extruded products.

ETHYL ACETANILIDE

ETHYL ACETANILIDE $C_6H_5NC_2H_5CO$
 CH_3

A white crystalline powder with a faint odor.

Properties:

Specific gravity	1.087
Melting point	54°C.
Boiling point	258°C.
Flash point	124°C.

Solubility:

Soluble in most organic solvents.

Uses:

Substitute for camphor in the nitrocellulose industry.

ETHYL ALDEHYDE

See Acetaldehyde.

ETHYL CELLULOSE PLASTICS

The best known of the plastic materials prepared by the esterification of cellulose are ethyl cellulose and benzyl cellulose.

Ethyl cellulose is compatible with a wide variety of natural and synthetic resins. A great number of the waxes are compatible with it, except paraffin. It is resistant to alkalis. Because of this resistance it has been proposed as a container for alkalis. It has also been

ETHYL FORMATE

proposed as useful in extrusion operations.

Transparent sheets of this material are being used as electrical insulators and for packaging. Its dielectric properties are excellent.

These plastics have half the bounce of real rubber. Products can be developed possessing various degrees of flexibility. They may be rendered flameproof and some of them excel rubber in qualities of tensile strength, abrasion resistance and impermeability to gases and liquids.

One type of plastic prepared from ethyl cellulose may be used to replace rubber in electrical and surgical tape, hospital sheeting, rubber gloves, garden hose and footwear. Another type may insulate electrical wiring in bombing planes since it neither hardens nor cracks at sub-zero temperatures. A third type will waterproof fabrics for military purposes such as tents, gun covers, gas masks and raincoats. Baby's pants may also be prepared from it.

ETHYL FORMATE (Formic Ether,
Methenyl) $HCOOC_2H_5$

An unstable liquid, water-white in color. It has a pleasant, aromatic odor.

Properties:

Specific gravity	0.900-0.930 (20°C.)
Boiling point	54.3°C.
Melting point	-80.5°C.
Refractive index	1.3046 (20°C.)
Flash point	-19°C.

ETHYL HYDRIDE

Solubility:

Miscible with benzene. Soluble in water, alcohol, ether.

Uses:

Substitute for acetone.

ETHYL HYDRIDE

See Ethane.

ETHYL METHYL KETONE

See Methyl Ethyl Ketone.

ETHYLACETIC ACID

See Butyric Acid, Normal.

ETHYLENE ALCOHOL

See Ethylene Glycol.

ETHYLENE GLYCOL (Ethylene Alcohol, Glycol, Glycol Alcohol), $\text{CH}_2\text{CHCH}_2\text{CH}$

A syrupy sweet liquid which is clear and colorless. It is hygroscopic and it lowers the freezing point of water.

Properties:

Specific gravity1.125
Boiling point197.37°C.
Melting point-12°C.
Refractive index1.430 (25°C.)

EUGENOL

Solubility:

Soluble in water, alcohol, ether.

Uses:

As a refrigerant.

Substitutes:

Ethyl-potassium phosphate.
Methyl-potassium phosphate.
Neutralized alkyd phosphates.

ETHYLENE OXIDE

See Carboxide.

EUGENIC ACID

See Eugenol.

EUGENOL (Eugenic Acid, Caryophyllie Acid) $\text{C}_3\text{H}_5\text{C}_6\text{H}_3(\text{OH})\text{OCH}_3$

An oily liquid obtained by extraction from clove oil. It is colorless or yellowish and on exposure to the atmosphere it turns brown.

Properties:

Specific gravity1.0696
Boiling plant253.5°C.

Solubility:

Soluble in alcohol, ether, chloroform.
Only partly soluble in water.

Uses:

It may be used in place of clove oil for many of its applications in perfumes, essential oils, medicine, etc.

It is also used in the manufacture of vanillin.

EXTENDEX C.

Trade name for a rubber extender. It is a sponge-like material prepared by a patented process from vegetable oils. It may be used to replace from 5-20% of the rubber in many types of compounds.

It is claimed to enter readily into the vulcanization reaction.

It is insoluble in water and the common organic solvents.

It is claimed that it may be used in place of rubber in tires without impairing abrasion resistance or wear.

EXTON

Trade name for bristles made from nylon. It is dull white in color and it may be dyed.

Properties:

Melting point264°0

Density1.4

Refractive index1.55

Solubility:

Soluble in cresol, phenol, formic acid, concentrated mineral acids.

Uses:

These bristles are very tough, have extreme mechanical strength and uniformity, and are resistant to moisture.

They are used to replace natural bristles obtained from foreign countries. It is claimed that they wear several times longer than natural bristles.

F

FABINETTES

A group of German artificial leathers. They find as substitutes for shoe leather. They are said to contain rubber latex, reclaimed rubber or buna as binders with various animal, vegetable or artificial fibers, or shredded leather.

FABRIKOID

A material which resembles leather and which serves many useful purposes. It is made by coating cloth with pyroxylin made into a free-flowing jelly by the addition of suitable solvents. It is an artificial leather.

FACTICE

A product of the action of sulfur or sulfur chloride on vegetable, fish or other types of oils. It may thus be looked upon as a vulcanized oil.

This product is available in two grades, according to the color.

White Grades: White factice is derived from rape or colza oils. Erasing rubbers contain white factice. In some cases rubber is absent completely. It is sometimes used as an adulterant of reclaimed rubber and of gutta-percha. It facilitates tubing and other processing operations.

Brown grades: Used in rubber compounding. It is added directly to the crude rubber. It facilitates processing and imparts a velvet feel to the finished product.

Factices are solid jellies, insoluble in rubber solvents. They disperse into very

dilute gels and can be saponified by treatment with alkalis. They do not oxidize or become resinous.

Rubber goods containing factice cannot be used in contact with steam or hot water.

FAGELANES

A leather substitute made in Germany. It is claimed to be based on fabrics coated with water insoluble substances including drying oils, butadiene derivatives, cellulose lacquers, acryl resins and other synthetics.

FAIRPRENE

Trade name for a neoprene-coated fabric. It resembles sheet rubber in appearance. It is claimed to be made from "Grade A" airplane cloth coated and impregnated with neoprene compound.

It is claimed that as a vibration absorber it is less susceptible to damage due to constant flexing, sudden changes in temperature, and to deterioration from oil than is synthetic rubber alone.

Under heat and pressure this material is molded into such articles as gaskets, oil seals, valve cups, shock mountings, couplings, fuel-pump diaphragms, etc. It may also be used as sealing tape for floats and gas tanks in airplanes; in friction belting, shock cord, hose, engine parts and electrical equipment.

FECULOSE

Name for certain type of commercial starch esters obtained by the action of

FEDRALITE

glacial acetic acid on starch. These esters do not differ very greatly from ordinary starch in chemical properties and appearance.

When washed feculose is neutral or slightly acid and it reacts more readily than ordinary starch with most chemical reagents.

It is used as a substitute for gelatin and vegetable gums.

FEDRALITE

Trade name for a three inch plastic tubing made to replace steel pipe for shot hole casing in seismographic oil field exploration work.

FEED YEAST

A yeast produced from the press juice of cannery waste dehydration plants. It is claimed that alcohol can be obtained from the press juice with an average yield of 91% of the theoretical. It is estimated that raw materials cost is less than half that of backstrap molasses.

FEL-PRO THIOKOL STRIP MATERIAL

Trade name for a specially processed felt base treated with Thiokol.

It is claimed that this product can be used in applications which require a spongy type of rubber strip.

FELDSPAR

General name for a group of rock forming minerals. They occur in the United States, Norway, Sweden, Italy, Canada, Russia.

Properties:

Specific gravity2.55-2.75

Uses:

It has been found to be superior to mixtures of salt, pitch, ashes or fine powders in extinguishing magnesium incendiary bombs.

In ceramic glazes.

Substitutes:

Whiting.

FELSEAL

Trade name for a special Thiokoled fish paper fiber which may be used as a gasket material on oil pumps, transmission, etc., in order to obtain perfect sealing on units of this nature.

FERRIC SULFATE (Iron Sulfate, Ferric Tersulfate, Iron Tersulfate, Iron Sesquisulfate)

A grayish-white powder.

Properties:

Specific gravity3.097
(anhydrous)
2-2.1 (Hydrated)

Melting pointdecomposes

FERRIC TERSULFATE

Solubility:

Soluble in water.

Uses:

Substitute for aluminum sulfate in the manufacture of certain grades of paper and in the coagulation of water.

FERRIC TERSULFATE

See Ferric Sulfate.

FERRICHROM GLUCOSATE

A ferric salt of quachrom glucosate.

Uses:

As a substitute for aluminum powder in the manufacture of anti-corrosion paints.

FIBER PIPE

A substitute for steel casing in oil wells. The fiber pipe is cemented in the well.

FIBERGLAS

Trade name for a special glass. It is obtained by means of a mechanical process in which the glass is reduced to a flexible thread or filament which can be woven into cloths of various kinds.

FIBERGLAS AE BOARD

The resulting product has all the chemical properties of glass. It is non-burning, non-decaying and acid-resisting. It retains its resiliency permanently. Its efficiency is not affected by moisture.

Fiberglas is available in two basic forms,—wool and fibers for textiles.

The wool form of Fiberglas is used as an insulating material which is light in weight. The fiber form is used for weaving into cloths which are being used to replace asbestos curtains, for electrical insulation where high strength and chemical resistance are desirable and for cloths in filter presses. When felted and compressed into bats, these fibers form a flexible and efficient insulation for refrigerators and other types of low-temperature equipment.

One of the interesting uses for Fiberglas is as insulation for electrically heated divers' suits. On investigation it has been found to be the only material which is completely safe.

FIBERGLAS AE BOARD

Trade name for an asphalt-coated board which is used for low-temperature and roof insulation. It is claimed that it possesses all the insulating properties of cork and to be superior in several qualifications.

It replaces cork in insulation installations.

This material is claimed to be made of pure glass fibers, compressed to a density of six pounds to the cubic foot. It is completely enclosed in a sheath of asphalt that has a high melting point. The asphalt coating provides a substantially waterproof seal and increases the stiffness and rigidity of the insulation so that

FIBERGLAS OC-9 BOARD

it can be used to build self-supporting partitions or to carry floors.

FIBERGLAS OC-9 BOARD

This is a trade name product which is composed of fine resilient glass fibers, compressed and treated with a binder which is claimed to give it sufficient rigidity to serve as a self-supporting, fire-resistant material. It can be faced with glass fiber cloth, plywood and other surfacing materials.

FIBREX

Trade name for a non-metallic wire which is non-inductive, ozone-proof and especially designed for overhead power lines. Its resistance to abrasion is particularly effective in cases of wear caused by the swaying branches of trees.

FIBRO

A synthetic fiber manufactured in the United States. It is said to be a rayon like material which is made by the stretch spinning method.

FISH PROTEIN FIBER

A German synthetic fiber. It is claimed to be made from pure, odorless fish proteins. According to reports received, the fish protein is mixed with viscose. It is said to be suited for textile purposes. It can be dyed with acid dyes.

FLEXO WAX C

FLAKE WHITE

See Cremnitz White.

FLAMENOL

Trade name for a plasticized vinyl chloride polymer. Although classed as a synthetic rubber it is completely saturated and hence cannot be vulcanized. Its properties are similar to those of Koro-seal.

It is used mainly as a heat-resistant electrical insulation material.

Nigrite.

FLAX

Leather may be used instead of flax for packings. It may be used where the temperature is not excessive. The results are comparable with flax.

Koorinja fiber is another substitute for flax.

Flax may also be replaced by a new product called rayon tow which is an untwisted rope made of countless continuous strands of viscose rayon, braided and impregnated with lubricants.

FLAXSEED OIL

See Linseed Oil.

FLEXO WAX C.

Trade name for a long chain hydrocarbon which is an amorphous wax.

FLEXORESINS

FLINT

Properties:

Specific gravity0.82 (25°C.)
Melting point63-68°C.
Flash point257°C.

Solubility:

Soluble (hot) in naphtha, toluene, mineral spirits, mineral oil.

Insoluble in water and alcohols.

Uses:

Replace ceresin, cerise wax and beeswax.

Replaces paraffin wax as a wood impregnant. It is claimed that it prevents warpage, decreases the time required for impregnation and gives increased acid and alkali resistance.

used for waterproofing cement, concrete, stucco, etc.

FLEXSEAL

A new type of safety glass which is claimed to have a strength ten or more times that of ordinary safety glass used in automobiles. It is manufactured much like ordinary safety glass except that in the case of Flexseal the plastic extends beyond the edges of the glass and thus serves as a rubber-like rim all around the product. It is said that this rim can be bolted, screwed, cemented, pressed or nailed.

The manufacturers claim that Flexseal combines the toughness, strength and elasticity of a special plastic with the hard surface, good vision and rigidity of a heat-treated glass.

FLEXORESINS

Trade name for a series of terpene resins which range from a hard solid to an oily liquid. These resins possess no acid number and do not develop acidity with age.

Solubility:

Soluble in turpentine, benzol, toluol, naphtha, acetone, ethylene dichloride, ethyl, butyl, and amyl acetate. Also soluble in oils.

Insoluble in water.

Uses:

Claimed to increase the adhesion and flexibility of paints and adhesives. Also

FLINT (Silex)

A form of natural silica or quartz which is brownish-black gray in color. It comes in crystalline or lump form.

Properties:

Specific gravity2.60-2.63

Solubility:

Soluble in hydrofluoric acid.

Insoluble in water.

Uses:

In the manufacture of porcelain, pottery and enamel-ware.

FLOREX

Substitutes:

Pyrophyllite containing approximately 15% of sericite.

FLOREX

Trade name for a product said to be similar to Floridin in its properties and uses. By treatment by extrusion under pressure its absorptive properties have been increased.

Uses:

As a decolorizing agent of petroleum products, mineral oils and waxes, vegetable oils and waxes.

FLORIDIN

Trade name for a product which is grayish-white in color and said to resemble Fuller's earth in its properties and its uses.

Properties:

Specific gravity2.3-2.6

pH (in distilled water)7.9-8.5

Uses:

When heated to equilibrium weight at 900°F., it changes color and becomes resistant to the action of water. Its apparent density is lower. In this condition it is a cheap substitute for the more costly catalytic salt supports.

It is replacing pumice: e.g., as a support for copper salts in the copper sweetening process.

FOAMAPIN LIQUID

FLORITE DESICCANT

Trade name for an absorbent, granular product which is porous in structure.

It is available in several forms depending upon the mesh size.

Uses:

Substitute for calcium chloride as a desiccant for industrial and laboratory use.

FLOWERS OF BENZOIN

See Benzoic Acid.

FLOWERS OF TIN

See Stannic Oxide.

FLOWERS OF ZINC

See Zinc Oxide.

FLUOREX

Trade name for a liquid insecticide which combines the properties of pyrethrum, rotenone and isothiocyanates.

FOAMAPIN LIQUID

Trade name for a new foaming agent. It is said to be produced from freely available natural raw materials.

FOAMGLAS

It is claimed that the foam produced by this new agent is strong and durable. It is compatible with latex, dextrin, algin and starch.

Foamapin Liquid is soluble in water and the solutions thus formed are said to be stable.

This product may be used as a substitute for saponin.

FOAMGLAS

Trade name for a glass product which is utterly unlike ordinary glass. Although it is a true glass it is black in color, opaque, floats on water, is much lighter than ordinary glass, more buoyant than cork, can be sawed, drilled or shaped without chipping or shattering.

This glass is made by mixing a little carbon with ordinary glass and heating to the proper temperature. At this temperature gas is formed which bubbles through the glass and puffs it up causing it to become full of tiny, non-connecting air cells much like foam rubber. A block of Foamglas may be compared to a mass of tiny sealed air-chambers.

Properties:

Conductivity45 B.t.u. per hr.
per sq. ft. per degree F. per in.
(70°F.)

Coefficient of expansion 0.0000046

Specific heat16-.19 B.t.u. per
lb. per °F.

Crushing strength150 lbs. per
sq. in.

Impact strength66 ft. lb.

Uses:

It is claimed to be waterproof, and vaporproof. It will not burn, is rigid, and unaffected by the common forms of deterioration. It is verminproof and odorless.

FOREST PRODUCTS

For insulating refrigerated storage rooms and equipment.

Replaces cork, balsa wood, cellular rubber and kapok as filler for life preservers and life rafts.

FOREST PRODUCTS

Forest products and derivatives are serving an important part in the war effort by replacing valuable tin in a great number of products. A short table may serve to show how this is being done.

Product	Wood Product Being Used
Bearings (Babbitt metal)	Lignin and fabric composition.
Boxes and cans	Paperboard cartons. Molded pulp cans. Plywood. Solid wood.
Buttons (Tinned)	Laminated paper plastics.
Clips	Laminated paper plastics.
Cups (Kitchen)	Lignin and cellulose plastics.
Kitchen utensils	Laminated paper and paper plastics. Wood veneer.
Ornaments	Wood. Lignin and cellulose plastics. Paper plastics.
Pails	Molded pulp. Laminated paper plastics. Wood staves (coated).
Plates	Paper board stamped or molded.
Roofing	Wood shingles. Impregnated paper.
Trays	Lignin and cellulose plastics. Wood products. Paper plastics and pulp.
Tubing	Cellulose plastic tubing. Laminated paper plastics.

FORMALDEHYDE

FORMOL

FORMALDEHYDE (Oxymethylene, Formalin, Formalith, Formic Aldehyde, Formol) HCOH

Clear liquid with a suffocating pungent odor. It is colorless. It is an aqueous solution of formaldehyde gas.

Properties:

Specific gravity1.075-1.081
Boiling point (gas)-21°C.

Solubility:

Miscible with water and alcohol.

Uses:

As a preservative. It may replace phenol as such.

In the after treatment of dyed textile fabrics.

Substitutes:

Chlorothymol, parachlorometacresol, parachlorometaxylenol as a preservative.

Aluminum formate, copper sulfate, sodium bichromate with aluminum sulfate and acetic acid, lignin sulfate, aluminum acetate may all be used in the aftertreatment of dyed textile fabrics.

FORMALIN

See Formaldehyde.

FORMALITH

See Formaldehyde.

FORMAMIDE (Methanamide) HCCNH_2

A heavy, hygroscopic liquid which is

colorless and odorless. It is obtained when ethyl formate and ammonia are allowed to interact with each other.

Properties:

Specific gravity1.146
Boiling point200-212°C.

Solubility:

Soluble in water and alcohol.

Uses:

Substitute for acetamide in the preparation of methyl amine.

Substitute for glycerine.

FORMEX

Trade name for a polyvinyl formal product which is obtained by the hydrolysis of polyvinyl acetate and formaldehyde.

It is used extensively as electric insulation applied to magnet wires.

FORMIC ALDEHYDE

See Formaldehyde.

FORMIC ETHER

See Ethyl formate.

FORMIN

See Hexamine.

FORMOL

See Formaldehyde.

FORMONITRILE

FORMONITRILE

See Hydrocyanic Acid.

FORMOSA CAMPHOR

See Camphor.

FORMVAR

Trade name for a synthetic resin of the polyvinyl methylal type. It is practically colorless.

Solubility:

Soluble in chlorinated hydrocarbons, dioxan, acetic acid.

Insoluble in alcohol, acetone, benzene, toluene.

Uses:

In the manufacture of lacquers, wire enamel, coatings.

It may also be used as the sandwich layer in safety glass.

FORMYL TRICHLORIDE

See Chloroform.

FORTE FIBER

A synthetic acetate fiber made in Great Britain by the stretch spinning process.

FOSSIL FLOUR

See Diatomaceous earth.

FOSSIL RESIN

See Amber.

FULLER'S EARTH

FOSSIL WAX

See Ozokerite.

FOSSILITE

See Activated carbon.

FRENCH CHALK

See Talc.

FREON

Trade name for a series of products which are chlorine-fluorine derivatives of methane.

Uses:

Refrigerants.

FULLER'S EARTH

A clay relatively high in magnesia. It is found generally in the southern part of the United States.

Uses:

As a clarifier it may be used as a substitute for activated carbon.

It is also used as a filtering medium, rubber filler, in the bleaching and cleansing of cloth, in the manufacture of cosmetics, etc.

Substitutes:

Floridin.

Diatomaceous earth may also be used as a substitute for fuller's earth.

FULLOGEL

FULLOGEL

Trade name for a specially treated fuller's earth.

Uses:

Substitute for bentonite in its various technical applications.

FURFURAL (Furool, Artificial Oil of Ants, Furfuranecarboxylic Aldehyde, Pyromucic Aldehyde, Furfuraldehyde) C_4H_4OCHO

A colorless liquid which becomes amber colored when exposed to light and air. It possesses a characteristic odor.

Properties:

Specific gravity1.1598 (20°C.)
Melting point-36.5°C.
Boiling point161.7°C.
Refractive index1.5260 (20°C.)

Solubility:

Soluble in alcohol, ether, benzene.

Slightly soluble in water.

Uses:

Replaces phenol as a selective solvent in petroleum refining.

Ingredient of grinding compositions. As a fungicide in the treatment of seeds. In the manufacture of synthetic dyes. In insulating compositions. As a preservative. As a solvent in the manufacture of varnishes and lacquers. As a solvent for resins and rubber cements. As a general antiseptic and germicide.

Substitutes:

Cresol and formaldehyde may be used

FUROYL CHLORIDE

as insecticides, germicides and general antiseptics in place of furfural.

FURFURALDEHYDE

See Furfural.

FURFURAMIDE

See Hydrofuranide.

FURFURANECARBOXYLIC ALDEHYDE

See Furfural.

FUROL

See Furfural.

FUROYL CHLORIDE C_4H_3OCOCI

A colorless liquid which is obtained when furoic acid is treated with phosphorus pentachloride. It is a powerful lachrymator and must be treated with great care.

Properties:

Melting point-2°C.
Boiling point176°C.

Solubility:

Soluble in ether.

Decomposes in water.

Uses:

Substitute for chloropicrin in the disinfection of grain elevators.

FUSEL OIL

**FUSEL OIL (Amyl Alcohol Normal,
Grain Oil, Potato Spirits, Potato
Oil, Pentanol)**

A colorless liquid with a disagreeable odor. It is obtained as a by-product in the alcoholic fermentation of such products as potatoes, grapes, grain, etc.

Properties:

Specific gravity0.82 (20°C.)

Boiling point137°C.

Flash point108°C.

Solubility:

Soluble in water, alcohol and ether.

Also soluble in gasoline.

Uses:

Substitute for butyl alcohol as a lacquer thinner, shock-absorber fluid and as a hydraulic brake fluid.

It is also used as a general solvent in analytical processes, fruit flavoring syrups, nitrocellulose, essential oils, fats and waxes, etc. It has been used as a constituent of airplane fuel and fuels for internal-combustion engines.

G

G. B. S. SODA

Trade name for white, globular-shaped pellets of sodium bisulfate. They dissolve in water with a strong acid reaction. In alcohol they decompose.

Used as a substitute for sulfuric acid for pickling, dye bath, etc.

GALALITH

Trade name for a formaldehyde-casein plastic product. It is an artificial horn and it is used as a substitute for ivory, tortoise-shell, bone, amber, ebony and the like. It is non-inflammable.

GALLA

See Galls.

GALLS (Nutmalls, Galla, Aleppo Galls, Mecca Galls, Turkey Galls)

Outgrowths on various types of oak trees due to deposits of insect eggs. These usually come from Persia, Syria, Turkey and Tripoli. Poorer grades come from Italy, France, Germany and Austria.

Uses:

A source of tannic acid.

Substitutes:

Pecan shells.

Canaigre root.

GAS BLACK

See Carbon Black.

GELATIN (Glutin)

An organic nitrogenous colloidal substance belonging to the group of proteins. It is available in two forms,—edible and technical. A third group might also be added,—photographic gelatin. Each type is prepared in its own manner. Edible gelatin must be prepared from clean materials under sanitary conditions and it must be free from objectionable odors, colors, bacteria, etc. The photographic gelatins possess high jelly strength. The technical grade is obtained from bones, white connective tissue and the skin of animals. Usually the jelly strength is high and the color light.

Uses:

In rayon sizing.

Adhesives.

Leather dressing.

Photography.

Food.

Etc.

Substitutes:

Dextrin sizing gum and a resin binder, casein derivatives, polyvinyl alcohols, methylcellulose. These may be used in rayon sizing. Feculose may substitute for gelatin in various technical applica-

GELOWAX

tions. Dextrin with a resin binder may substitute for gelatin.

Sodium alginate is also a substitute for gelatin.

Superdex.

Agar-agar.

Protoflex.

GELOWAX

Trade name for a straw-colored amorphous wax, about as hard as beeswax. Its lustre is poor.

Properties:

Melting point63°C.
(Softening point)

Solubility:

Soluble (hot) in hydrocarbons, carbon tetrachloride and other chlorinated solvents.

Insoluble in water.

GELVA RESINS

Trade name for a series of neutral, water white resins of the polyvinyl acetate type.

Properties:

Specific gravity1.118-1.192

Solubility:

Soluble in lacquer solvents and aromatic hydrocarbons.

Insoluble in aliphatic hydrocarbons.

GIGILY OIL

Uses:

Lacquers, chewing gum base, adhesives, coatings, impregnation.

GENERATOR GAS

It has been reported from Germany that successful experiments have been carried out with generator gas produced from peat found in Holland. Wood and anthracite are also widely used for the production of generator gas. It is claimed that this replaces mineral oils. Ordinary gas and liquefied butane are now being used for fuel tanks of trucks under one and a half tons.

GERANIOL

A yellowish liquid with a rose-like odor. It is obtained from geranium oil.

Properties:

Specific gravity0.8812

Melting point-15°C.

Boiling point230°C.

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

Substitute for rose oil as an odorant.

GIGILY OIL

See Sesame Oil.

GILDER'S WHITING

See Whiting.

GIMCO

Trade name for a rock wool.

GINGELLY OIL

See Sesame Oil.

GINGILI OIL

See Sesame Oil.

GINGILY OIL

See Sesame Oil.

GLASS

Glass is one of the oldest synthetic materials known to man. Its history goes back so far as to disappear into obscurity. Today a great many unorthodox uses for glass are being found. With many metals difficult to obtain it has been reported that glass may serve as a substitute in some cases and the resulting product in other cases has been found to be superior to the original material used.

Copper, aluminum, bronze and other scarce metals are being replaced by glass. Centrifugal pumps have appeared on the market with impellers, plates and other parts made of glass. Electric irons with glass sole plates will be in use in the near future. Glass plumbing is a possibility of the future insofar as private homes are concerned. Industrial glass

plumbing is already in use. Foamglas will soon be manufactured into fisherman floats.

The use of glass-lined steel equipment in industry is rapidly increasing. Where severely corrosive acids and conditions are met, glass is solving many of the problems that formerly beset the manufacturer. It can also be used to replace many of the hard-to-obtain alloys which were used for lining steel tanks.

In the packing of food glass is replacing tin.

One use of glass is to substitute for large metal pipes which are intended for operation at high pressure. The pipe may be blown to the proper size and then enclosed in concrete for added strength.

Various new types of glass have been appearing on the market. One of the newest types is a cellular product which can be used for insulation purposes, particularly in the low temperature field and for corrosion resisting floats of various kinds. This product is a foamy type of glass which is totally impervious to moisture.

A new fibrous glass has been developed. This can be woven into cloth which may be used for acid and high-temperature resistant filters for liquid and gas filtration. It is used in the manufacture of electrical tapes and wire insulations.

Another new type of glass product is glass blocks which are partially evacuated, completely sealed hollow units formed by fusing together two halves of pressed glass. These blocks are capable of transmitting light while giving considerable heat insulation. They are capable of carrying a moderate load.

A new glass has been recently announced which is 96% silica. It closely

GLAURIN

approaches pure quartz in its behavior and performance.

A bullet-proof glass substitute has been produced in England. It combines two synthetic products, acrylic resins and cellulose acetate. The final product consists of two or more sheets of acrylic resin plastics with a suitable adhesive coating. An intermediate layer of cellulose acetate is present. The manufacturer claims that the optical quality is satisfactory even under conditions of extreme light and temperature.

Another new substitute produced in England is a cellulose acetone product with a corrugated face by means of which it is applied to a smooth backing. In this manner it attains rigidity. It is claimed to be weather resistant. Although the cost is high it is said to give a high degree of insulation and ultraviolet light passes through it.

GLAURIN

Trade name for diethylene glycol monolaurate. Pale orange to yellow oily liquid.

Properties:

Specific gravity	0.960 (27°C.)
Saponification value	191
Iodine value	5-8
Melting point	17-18°C.

Solubility:

Soluble in methyl alcohol, ethyl alcohol, acetone, ethyl acetate, ether, toluene, mineral oil, vegetable oil, diethylene glycol.

Insoluble in water, but it emulsifies readily on addition of small amounts of alkali.

Uses:

As a substitute for dibutyl phthalate as a plasticizer.

Replaces vegetable oils as a lubricant.

It has been reported that glaurin may be substituted for olive oil in various technical applications.

GLUCARINE B.

Trade name for a glycol carbohydrate complex. It is a water-white, odorless, clear liquid.

Properties:

Specific gravity	1.32(20°C.)
Hygroscopicity	Less than glycerine.

Solubility:

Soluble in water and alcohol, glycerin, diethylene glycol, ethylene glycol.

Insoluble in toluene, mineral spirits, mineral oil, vegetable oil, isohol.

Uses:

Substitute for glycerine where a cheaper and colorless product is desired.

GLUE

See Superdex

GLUTOLIN

Trade name for a methyl cellulose adhesive.

GLYCERIN

GLYCERIN (Glycerol, Glycol Alcohol, Propenyl Alcohol) $C_3H_5(OH)_3$

Pale yellow or colorless clear liquid. It possesses a sweet, warm taste.

Properties:

Melting point17°C

Boiling point290°C

Solubility:

Soluble in water and alcohol.

Insoluble in ether.

Uses:

Manufacture of cigarettes, chewing and smoking tobacco.

In the manufacture of natural gums and resins.

In cosmetics.

In food preparations.

In leather finishing.

As softener in glues, mucilages, printer's rollers.

In plasticizers and plastics.

In textile processing.

As a humectant.

In stamp pad inks.

Explosives.

Substitutes:

Akerite glycerin alternative, which is a trade name product claimed to be an aqueous, non-toxic liquid derived from corn

Aquaresin, Glucarine B., Monoglycollin.

Pentaerythritol as a processing material in making ester gums.

GLYCERYL MONORICINOLEATE

Apple syrup in the manufacture of cigarettes, chewing and smoking tobacco.

1.5 pentamethyleneglycol may be used in cosmetics.

Invert sugar, d-sorbitol, nulumoline in food preparations.

Arlex in leather finishing, and in glues, muscilages, printer's rollers.

Sodium lactate in textile processing.

Yumidol as a humectant.

Glyceryl monoricinoleate in stamp pad inks. Methyl cellulose may also be used instead of glycerin in stamp pad inks and in stencil inks.

GLYCEROL

See Glycerin.

GLYCEROL MONORICINOLEATE

See Glyceryl Monoricinoleate.

GLYCEROL MONOSTEARATE

See Glyceryl Monostearate.

GLYCEROL PHTHALATE

See Glyceryl Phthalate.

GLYCERYL MONORICINOLEATE (Ricinoleyl glycerin, Glycerol Monoricinoleate) $C_{17}H_{33}COOC_3H_5(OH)_2$

An orange-red, oily liquid.

GLYCERYL MONOSTEARATE

Properties:

Specific gravity1.019 (25°C.)
Iodine value 65-70
pH (25°C.)9.2-9.5 (5%
aqueous dispersion)

Solubility:

Soluble in water (dispersed). Soluble in methanol, ethanol, toluene (10%), cottonseed oil, ethyl acetate.

Insoluble in naphtha, mineral oil.

Uses:

Substitute for castor oil in hair dressings and other cosmetics.

Substitute for glycerin in the manufacture of stamp pad and similar inks.

GLYCERYL MONOSTEARATE (Glycerol Monostearate)

A tan wax-like solid. It possesses a faint odor.

Properties:

Melting point56-57°C.
Specific gravity0.97(25°C.)
Iodine value3-4
pH (25°C.)9.3-9.7 (3%)

Solubility:

Dispersible in hot water.

Soluble in hot alcohol and hydrocarbons.

Uses:

In edible emulsions.

In cosmetics.

GLYCOL ALCOHOL

Protective coatings for edible hygroscopic powders, etc.

In shortenings, cooking oils and fats.

GLYCERYL PHTHALATE (Glycerol Phthalate)

Water-white solid resin.

Properties:

Melting point67°C.
Specific gravity 1.29
Saponification value605-615
Acid value300-315

Solubility:

Soluble (hot) in alcohol.

Partially soluble in hydrocarbons.

Insoluble in water.

Uses:

Used in the manufacture of cement to replace shellac to give better thermoplastic effects and solvent retention.

GLYCERYL TRIACETATE

See Triacetin.

GLYCOL

See Ethylene Glycol.

GLYCOL ALCOHOL

See Glycerin.

GLYCOL BORI-BORATE

GLYCOL BORI-BORATE

See Aquarestin.

GLYCOLIC ACID (Oxyacetic Acid, Hydroxyacetic Acid) CH_2OH COOH

Colorless crystalline substance.

Properties:

Melting point78-79°C.

Solubility:

Soluble in water, alcohol, and ether.

Uses:

Substitute for tartaric acid in the printing of cotton fabrics.

GLYCOLIN

See Petrolatum, Liquid.

GLYPTAL

A series of resins of the alkyd type produced by reacting organic acids with glycerol. Their principal use is as a bonding agent for such smooth surfaces as glass, porcelain, mica, etc.

These resins may be colored and used as penholders, pencils, cigarette holders, beads, etc.

GOMAGEL

Trade name for a pure white edible powder which is said to be a modified protein made from freely available domestic raw materials. It is claimed to

GRAPE-SEED OIL

give viscosity and body in water similar to that of gum tragacanth ribbon.

It may be used in tooth pastes, cosmetics, textile finishes, polishes and for all purposes where the bodying of aqueous solutions is a desirable factor.

GOMMELINE

See Dextrin.

GRAIN OIL

See Fusel Oil.

GRAINAL

Trade name for a new class of ferro-alloys which were developed recently to conserve the supply of nickel, chromium, molybdenum and vanadium.

Synthetic or amorphous graphite from coke in electric furnaces.

GRAMINIA CITRATI OIL

See Lemongrass Oil.

GRAPE-SEED OIL (Grape-stone Oil, Winestones Oil, Raisin-seed Oil)

Yellow, oily liquid. It has an unpleasant odor with a bitter taste.

Properties:

Specific gravity0.9209-0.9350

Saponification value.....178-180

Solidifying point-10° to -15°C.

Iodine number 94-96.5

GRAPESTONE OIL

Solubility:

Soluble in benzene, carbon bisulfide.

Uses:

It may replace olive oil as a soapstock.

GRAPE-STONE OIL

See Grapeseed Oil.

GRAPHITE (Black Lead, Plumbago, Mineral Carbon)

An impure form of carbon which is black in color and greasy to the feel. It is found free in nature. Its color is steel-gray to black and it possesses a metallic luster.

Properties:

Specific gravity2.09-2.25

Hardness1-2

Uses:

In the manufacture of pencils, crucibles, molds, arc-light carbons, rust-proof paints and coatings, electrodes, ingredient of lubricant compositions, fertilizer compositions, inks, anti-scale agent, compositions for the repair of stoves, metal polishes, refractory cements, etc.

Substitutes:

As a lubricant diglycol stearate S may be used in place of graphite.

GREASE

Powdered mica has also been suggested as a substitute for graphite.

GREASE

A cellophane film is laminated to a light scrima cotton fabric and the resulting product is claimed to be a tough new wrapping material. This is impregnated with moisture-proof materials to increase its usefulness. Grease on guns may be replaced by it. This grease is usually heavy and the parts are coated with it to protect them from rust. Any soldier knows the pleasure of cleaning such guns, tank parts, plane parts, etc. This may now be avoided by the use of this new film.

GREEN BUTTER

See Borneo Tallow.

GREENLAND SPAR

See Cryolite.

GROUND EARTHENWARE

See Barium Sulfate.

GROUND-NUT OIL

See Peanut Oil.

GUAIAC WOOD (*Lignum Vitae*)

A very hard and dense wood obtained from the heartwood of the evergreen trees, *Guaiacum officinale* or *sanctum* found in the West Indies and northern South America.

Uses:

As a substitute for babbit metal in some of its applications.

In the manufacture of utensils and instrument of certain types.

GUAI-A-PHENE

Trade name for a product which is a mixture of phenols obtained from resinous pine wood. Its odor is similar to that of guaiacol.

Properties:

Specific gravity1.045(15.5°C.)

Solubility:

Soluble in caustic soda.

Uses:

It is claimed to exhibit anti-skinning, anti-gelling and anti-oxidant properties superior to guaiacol.

It may be used in the manufacture of paints, varnishes, printing inks, etc.

GUAYULE

A shrub native to Mexico with a high proportion of rubber. This shrub is planted in the spring and can be harvested to some extent the following autumn. It yields about 1100 pounds of rubber per acre when planted densely. If allowed to grow for four or more years the yield is increased and the subsequent cost is lowered.

At first its chief drawback for commercial use was the high percentage of resins present but this was overcome recently when means were found of removing them conveniently and easily.

It has recently been reported that the four year period of growth has been cut to two years.

GUHR

See Diatomaceous earth.

GUM CAMPHOR

See Camphor.

GUMS

It has been found that water-soluble cellulose derivatives, water-soluble resins and dispersible resins can replace gums in their various applications.

Adopon has also been used as a substitute for gums in finger-waving solutions.

GUN COTTON

GUN COTTON

See Nitrocellulose.

GUNK XP-92

Trade name for a new hand-wiping safety solvent. It is claimed to have no toxic vapors, no flash or fire point and to leave no invisible rust. It is also said to quickly lubricate and preserve wet metal surfaces from rust.

It is suggested as a safety replacement for naphtha, gasoline and kerosene for grease cleaning and hand-wiping.

GUTTA-PERCHA (Isonandra Gutta)

The purified, coagulated milky juice obtained from various trees of the genus Palaquium and Payena whose habitat is tropical Asia, South America and the Philippines.

GUTTA PERCHA

Properties:

Melting point120°C.

Solubility:

Slightly soluble in carbon disulfide, chloroform, benzene and warm benzene.

Uses:

Insulation of electrical wires and the like.

Dentistry.

Waterproofing.

Belting.

Substitutes:

Chicle gum.

Anhydrex AA-60.

Nigrite.

H

HALOWAX

Trade name for a synthetic wax made from chlorinated naphthalene, synthetic resins, and combinations of the two.

It is used chiefly for electrical insulation materials, wire coatings, and fabric coatings.

HEAVY MAGNESIA

See Magnesium Oxide.

HEAVY SPAR

See Barium Sulfate..

HELIUM He

A colorless, inert gas found in the atmosphere. It may be obtained by fractional distillation of liquid air.

Properties:

Boiling point-267°C.

Liquefying temperature -268.82°C.

Uses:

As a substitute for argon in the filling of incandescent lamps.

HEMP

Most of the hemp used in the United States was formerly imported from the

Far East. Since our supply has been cut off the problem has been to find a suitable substitute for it. The Department of Agriculture has distributed hemp seeds to planters in Kentucky and other states. For a great number of years there has existed a small hemp industry in Kentucky. With the aid of the United States Department of Agriculture this will be expanded.

Excellent results have been obtained with the use of asbestos instead of hemp for packings. Part of our needs for asbestos is supplied by this country but the remainder of our requirements is imported from Canada. This asbestos may be used in place of hemp where heat resistance is required.

Hemp in rope may be replaced by yucca, a fibrous bladed plant which grows in four of our Western states. It is good for rope except for marine use. Good results have also been obtained when yucca is used for twine, burlap and upholstering materials.

HERCOSE C.

Trade name for a newly developed product which is a non-flammable cellulose ester. Its properties make it suitable for special lacquers which show resistance to heat, light and moisture. Chemically it is cellulose acetate butyrate. It is available in the form of a colorless film or as white flakes. It is practically odorless.

Properties:

Softening point215-225°C

Refractive index1.47(25°C.)

HERCOSOL

Solubility:

Soluble in a wider range of solvents than cellulose acetate.

It is more miscible with gums and plasticizers than cellulose acetate.

Uses:

It is useful in non-discoloring lacquers.

HERCOSOL

Trade name for a special solvent which is a mixture of terpene hydrocarbons and terpene ketones. It is a water-white in color.

Properties:

Specific gravity 0.895-0.905 (20°C.)

Distillation range.....175-225°C.

Uses:

Solvent for nitrocellulose lacquer, varnish thinners, enamel thinners, resins.

Wetting and dispersion agent.

HERRING OIL

Pale yellow to dark red liquid.

Properties:

Specific gravity0.920-0.932

Saponification value179-194

Iodine value130-142

Refractive index1.478

HEXAMINE

Solubility:

Soluble in ether, chloroform, benzene, carbon bisulfide.

Uses:

In Norway it is used as a substitute for olive oil after the taste has been removed.

HEXACHLOROETHANE

See Carbon Trichloride.

HEXAMETHYLENETETRAMINE

See Hexamine.

HEXAMINE (Hexamethylenetetramine, Methenamine, Formin, Urotropin, Ammonio-formaldehyde, Cystogen, Aminoform) $(CH_2)_6N_4$

White crystals which have an irritating effect upon the skin.

Properties:

Sublimes at 263°C., partly decomposing.

Solubility:

Soluble in water and alcohol.

Insoluble in ether.

HIPERSIL STEEL

Uses:

As a hardening agent in phenol-aldehyde resins.

Substitutes:

Hydrofuramide.

HIPERSIL STEEL

A special type of silicon steel which is produced by certain melting, heat treatment and rolling techniques that rearranges its crystals and improves its magnetic properties. It carries a third more magnetism than does ordinary silicon steel. This process is designed primarily to save nickel and it enables small amounts of Hipersil steel to do the work of a larger amount of ordinary electrical steel.

HOFA FIBER

A synthetic fiber made in Germany. It is believed to be a mixture of viscose and wool fibers. It is a coarse filament which resembles horsehair and it is said to be a suitable substitute for hemp and jute.

HUBBELITE

An oxy-chloride cement containing copper which is a recent development. This product possesses very high tensile strength and adhesive properties. It is fungicidal and germicidal and is also highly resistant to abrasion. It is used as a floor covering, a paint or skin coat for concrete tanks, swimming pools, etc.

HYDREX ROSIN

HYCAR

Trade name for a synthetic rubber which is said to be a butadiene copolymer. It is a thermosetting material and available in crude sheet form ready for compounding into any type of stock.

Two types are available; OR (oil resistant) and OS (oil soluble).

OR type is highly resistant to oil, heat, abrasion and aging. It is highly resistant to water as compared to natural rubber and may be used where resistance to dilute acids and alkalis is important. It can be used at temperatures of 300°F and in a few limited cases it can be used at temperatures up to 400°F. Its abrasion and age resistance is superior to that of natural rubber. Its ability to absorb energy is much better than that of natural rubber and its flex life is comparable.

Hycar OS is superior to Hycar OR in elasticity and rebound and in general more nearly resembles natural rubber than does the other synthetics. OR and OS may be blended to form many desirable compounds. They are compatible with polyvinyl chloride and many similar materials.

Uses:

Hose, printing rolls, general mechanical goods.

Gaskets, tubing, bumpers, vibration insulators, packings.

HYDREX ROSIN

Trade name for a pale wood rosin. It is said to contain no added chemicals, to possess higher melting points and better solubility than regular pale wood rosin.

HYDROCYANIC ACID

HYDRON

Properties:

Melting point63°C.

Acid number154

Saponification value161

Uses:

Synthetic resins, printing inks, wax paper, battery wax, adhesive tape, solders.

HYDROCYANIC ACID (Prussic Acid, Hydrogen Cyanide, Formonitrile) HCN

A water-white liquid which is very poisonous.

Properties:

Specific gravity0.6970

Boiling point26.5°C.

Solubility:

Soluble in water and ether.

Uses:

Fumigation.

Substitutes:

Tritex.

HYDROFURAMIDE (Furfuramide) OC₄ H₈CH(NCHC₄H₂O)₂

Light brown to white powder.

Properties:

Melting point117°C.

Solubility:

Soluble in alcohol and ether, chloroform, furfural, aniline, acetone.

Slightly soluble in water.

Insoluble in glycerin and turpentine.

Uses:

Substitute for hexamine as a hardening agent in phenol-aldehyde resins.

HYDROGEN

In gas thermometers.

Substituted by argon, which see.

HYDROGEN CYANIDE

See Hydrocyanic Acid.

HYDRON

Trade name for a new product which is claimed to make concrete several times more resistant to weather and abrasion. It is said to be an absorptive lining for forms in which concrete is poured. It removes the water and air bubbles from the surface of the concrete and the resulting product has a smoother finish without brushing or scraping.

HYDRORESIN

Trade name for an amino-abietic resin. It is a reddish-orange viscous fluid which is practically non-drying.

Properties:

Specific gravity1.11-1.13

pH (4% dispersion).....8.75

Acid value12

Solubility:

Soluble in methyl alcohol and toluene.

Dispersible in water.

Uses:

As a substitute for gum arabic as a binder.

HYDROXYACETIC ACID

See Glycolic Acid.

HYDROXYBENZENE

See Phenol.

HYDROXYCITRONELLAL (Citronellal Hydrate, Synthetic Muguet)

A pale yellow viscous liquid with a sweet odor. It is an oil.

Uses:

As a fixative in perfumery.

Substitutes:

Mugol.

HYDROUS MAGNESIUM SILICATE

See Talc.

HYPO

See Sodium Hyposulfite.

I

ICE STONE

See Cryolite.

ILICIIUM OIL

See Anise Oil.

INCELOID SOLUTIONS & SHEETING

Trade name for a product which is available in two forms; solutions and transparent sheetings.

The solutions are offered in clear and transparent colors, pigmented, metallics and pearl effects. The solutions are used for coatings and sealing. They are also used for impregnation.

The transparent sheetings are a flexible thin film suitable as a packaging sheet. The sheeting is manufactured from cellulose acetate and ethyl cellulose.

This product is non-flammable and offers no fire hazard. It is completely water proof and some types are moisture impervious.

Uses:

A transparent wrapping for food products of any kind, pharmaceuticals, tobacco, wearing apparel, etc. It is also used as an insulator.

INDALONE

Trade name for a product which is α - α -dimethyl- α -carbobutoxy-dihydro- γ -pyrone.

Uses:

It is claimed to be a substitute for sodium hyposulfite as an anti-oxidant in soaps.

It may also be used as an active ingredient for insecticides and suntan products.

INDENE

See Cumarone, Para.

INDIAN BALSAM

See Peru Balsam.

INDIUM

A ductible, shiny white metal. It is softer than lead.

Properties:

Specific gravity	7.362
Melting point	115°C.
Boiling point	700°C.

INDUSOIL

Solubility:

Soluble in acids.

Uses:

A 60% silver-40% indium alloy has the same appearance as sterling but is more than three times as hard.

In aviation and diesel engines, copper-lead and cadmium bearings with some indium added has been found to be extra strong and highly resistant to acid corrosion of lubricating oils.

It has been found that dental alloys of gold and indium stand up well under molar pressure and the tarnishing effects of acids.

Refractors for searchlights, headlights, etc., made from indium alloys have been found to be not as bright as those made from silver and other metals, but it is claimed that they retain a uniform value for longer periods of time.

It may be substituted for chromium and nickel plating since it takes a high polish and is resistant to discoloration.

It may be used as a substitute for tin. The chloride and sulfate are very toxic.

INDUSOIL

Trade name for a grade of tall oil.

Uses:

It is claimed that soaps made from this oil are often equal to the usual fat soaps. The cost of the soaps is low.

INSULINE

In the rubber industry it is being considered as a substitute for stearic acid, cottonseed fatty acids or hydrogenated fish oils. This prospect is still being investigated.

It may be used as a drying oil similar to linseed oil in the paint industry. It is also claimed to replace linseed oil as an impregnant for graphite electrodes used in the electrolytic production of chlorine.

INDUSTRIAL JEWELS

Most of the imperfect jewels which are mined find their use in industry. They are used as bearings and for grinding purposes.

It has been found that these industrial jewels which are used for bearings may be replaced with excellent effects by drops of fused hard glass.

INFUSORIAL EARTH

See Diatomaceous earth.

INSECT WAX

See Japan Wax.

INSULINE

A new type of pipe which is said to be made up of a thin shell of alloy steel with an outside thin shell of carbon steel. A non-critical insulating material is placed

IPORKA

between the two shells. It may be used for high-temperature, low-pressure service.

IPORKA

A synthetic resin made in Germany. It is a condensation product of urea and formaldehyde in the form of sheets of solid foam. It is claimed to be resistant to decay and it does not take on food smells. Unless it is coated it absorbs moisture. Glass fibers are added to increase its strength. It may be used to line the walls in refrigerator plants.

IRISH MOSS (Chondrus; Sea moss)

A sea-weed flourishing along the coast of Ireland and New England. It has been found to contain 9.4% of nitrogenous matter and 55.4% of mucilage.

Uses:

As a clarifying agent it may be used as a substitute for activated carbon.

Substitute for quince seed in lotions and hairdressings.

Substitutes:

Sodium alginate.

IRON OXIDE

It is normally used in the purification of gas.

ISOPROPANOL

Sulfur bacteria which is present in peat may be used as a substitute for iron oxide for this purpose. It is claimed that these bacteria can be used very effectively for the oxidization of hydrogen sulfide to sulfur providing the proper conditions for their activity are observed. This process is still in the experimental stage.

Iron oxide may also be used as a substitute for red lead in protective paints.

IRON SESQUISULFATE

See Ferric Sulfate.

IRON SULFATE

See Ferric Sulfate.

IRON TERSULFATE

See Ferric Sulfate.

ISINGLASS

See Activated Carbon.

ISONANDRA GUTTA

See Gutta-Percha.

ISOPROPANOL

See Isopropyl Alcohol.

ISOPROPYL ALCOHOL (Dimethylcarbinol, Propyl Alcohol, Isopropanol)
 $(\text{CH}_3)_2\text{CHOH}$

Colorless, clear stable liquid, with a pleasant odor.

Properties:

Specific gravity	0.7848
Boiling point	82.3°C.
Melting point	-89.5°C.
Flash point	54°F.
Specific heat 0.595 cal./gm. (20°C.)	
Refractive index	1.378

Solubility:

Soluble in water, alcohol, ether.

Uses:

Since its properties are similar to those of ethyl alcohol but superior in many respects and applications it has been found to be useful to replace ethyl alcohol with isopropyl alcohol in many industries.

ISOPROPYL ETHER $(\text{CH}_3)_2\text{CHOHCH}(\text{CH}_3)_2$

A colorless liquid with an ethereal odor. It is similar in many properties to ethyl ether except that it has a higher boiling point, evaporates more slowly and is less soluble in water than ethyl ether.

Properties:

Specific gravity	0.7238
Boiling point	68.4°C.
Flash point	-6°F.
Refractive index	1.3681

Solubility:

Miscible with most organic solvents and water.

Uses:

It is sometimes used to replace ethyl ether as a solvent and in extraction processes, where its lower volatility is an advantage.

ISOPROPYL-META-CRESOL

See Thymol.

ISOPROPYL-ORTHO-CRESOL

See Carvacrol.

IVORY BLACK

See Boneblack.

IVORY DROP BLACK

See Boneblack.

IWNAL

A special phenolic resin containing a new group of hydrocarbon constituents. It is said to be an alcohol soluble type and is characterized by its extremely high penetration powers that make it chemical and water resistant.

It is claimed to be useful for the impregnation of wood.

J

JALAP RESIN

A mixture of resins which is obtained when Jalap is extracted with alcohol. It is used as a substitute for scammony resin.

JAMESTOWN WEED

See Stramonium.

JAPAN (Japan Lacquer)

If linseed oil is heated with litharge and Prussian blue and the mixture is then thinned down with a solvent japan lacquer is obtained.

Uses:

Corrosion resistant coating for iron in place of zinc.

JAPAN CAMPHOR

See Camphor.

JAPAN LACQUER

See Japan.

JAPAN TALLOW

See Japan Wax.

JAPAN WAX (Japan Tallow, Vegetable Wax of Japan, Sumac Wax, Insect Wax)

A pale yellow flat cake wax which is obtained from a species of Rhus when the fruit is boiled in water.

Properties:

Specific gravity.....0.970-0.980

Melting point50°C.

Saponification value210-220

Iodine number5-12

Solubility:

Soluble in benzene, naptha.

Uses:

In the manufacture of shoe, furniture and floor polishes.

In the manufacture of soaps, candles, leather polishes.

Substitute for beeswax.

Substitute for bay-berry wax in the manufacture of candles.

Substitutes:

Nipocer N.

Blends of hydrogenated fats and some new waxes coming from South America.

JAPANESE GELATIN

JUTE

JAPANESE GELATIN

See Agar-Agar.

iron oxide. It is a tan colored paint and may be used as a substitute for red lead in protective paints.

JAPANESE ISINGLASS

See Agar-Agar.

JUTE

JIMSON WEED

See Stramonium.

Jute as used for the manufacture of burlap bags and twine is imported from India. Under the present circumstances when problems of transportation are paramount it is understandable why there should be a shortage of this vital material.

JOSITE

Trade name for a new paint which is said to contain 85% zinc oxide and 15%

Several substitutes have been suggested for jute. Among them are yucca, Hofa fiber, caroa, wild pineapple fiber.

The okra plant is also being studied as a source of heavy fiber to replace jute.

K

KAOLIN (China Clay, White bole, Bolus Alba, Argilla, Porcelain Clay)

A grayish white, inert powder, which is insoluble in water and dilute acids.

Uses:

As a filler in ceramics, paper, textiles, rubber, pencils, etc. A specially processed kaolin is being furnished. This material is being used as a substitute for the more expensive and more critical pigments such as zinc and titanium pigments. These include lithopone, titanium dioxide, etc. This kaolin is also being used in the recently developed resin emulsion paints, in wall paper printing and in the production of certain types of inks. Kaolins are also being produced for use instead of bauxite for the production of aluminum salts.

Substitutes:

Anhydrous calcium sulfate in rubber manufacture.

In England it has been found that china clay is an excellent substitute for asbestine and talc.

KARAYA GUM

A member of the group of bassora gums.

It has been found that sodium alginate serves effectively as a substitute for this gum.

KARROPAK

Trade name for a brown vegetable fiber gasket material. It is said to be carefully treated to maintain uniform softness and tensile strength.

Uses:

For service with oil, gasoline, water, gases and chemicals. It should not be used at temperatures exceeding 200°F.

KATCHUNG OIL

See Peanut Oil.

KAURIE

See Copal.

KELALIN

See Dekalin.

KELLIN

Trade name for a chemically treated linseed oil. It is claimed that this oil polymerizes rapidly and that it dries more rapidly than dehydrated castor oil.

This product is claimed to be a substitute for tung oil.

KELLSOY

Trade name for a fast-drying, chemically treated soybean oil.

It is claimed to be a substitute for tung oil.

KENNAMETAL

A trade name for an alloy of tungsten, titanium and carbon. It is useful as a material for machine tools. It may also be used for oil pump valves, valves for high pressure hydrogenation of coal, nozzles for spraying abrasive and corrosive powders and liquids.

KEROSENE

See Apco 467.

KIESELGUHR

See Diatomaceous earth.

KOHORN FIBER

A viscose synthetic fiber made in Japan. It is claimed that it resembles wool in its physical properties. Its elastic elongation is said to be equal to that of wool. It possesses a permanent curl and its heat insulating properties are excellent.

KOK-SAGYZ

A plant raised in Russia which is considered by them to be the most practical for the production of rubber. It is a close relative of the common dandelion.

The rubber itself comes from the root of the plant which bears 10-27 per cent of its weight in latex. The plant is claimed to be exceptionally hardy. It produces seeds the first year and it may be harvested the first season. However, it has been found that better results are obtained if the crop is not harvested until the second or third season.

KOLOK

Trade name for a patented process which deposits within the fibers of fabrics small particles of latex solids. This has the property of riveting the fibers together. It is claimed that the average useful life of most fabrics is doubled by means of this process. In addition it is said that the resistance to moths and shrinkage is increased after this process is applied.

KOORINJA FIBER

KOORINJA FIBER

A flax substitute which is prepared in Tanjora.

KOPOL

Trade name for a series of synthetic resins which include esterified copals, fused copals, modified copals and modified alkyds.

Properties:

Melting range165-200°C.

Acid number10-85

Solubility:

Soluble (cold) in acetates, coal-tar solvents, turpentine and drying oils.

Uses:

Rubbing, floor and spar varnishes, high-bake enamels, floor paints, metal primers.

KOROGEL

Trade name for a Koroseal product which is a gel claimed to be useful for making molds for casting plaster of Paris. It replaces glue-gelatin often used for the same purpose and it is claimed to be superior to the latter.

KOROSEAL

KOROLAC

Trade name for a Koroseal solution which is said to be suitable for coating electroplating racks and similar articles.

KOROPLATE

Trade name for Koroseal product which is claimed to be a paint suitable for highly corrosive services.

KOROSEAL

Trade name for a group of plasticized vinyl resins which may be classed as synthetic rubbers. Most of them are tasteless and odorless and all of them are non-toxic. The basis of these rubbers is polyvinyl chloride which is obtained from hydrogen chloride and acetylene. Polyvinyl chloride is a gas under normal conditions.

Properties:

Specific gravity1.20-1.41

Tensile strength2000-
3000 lbs. per. sq. in.

Elongation2-500%

This rubber is claimed to be very tear resistant and better than natural rubber in flexibility at normal temperatures. Its abrasion resistance is also claimed to be better than natural rubber at normal temperatures. At elevated temperatures it softens and flows. Oxygen and ozone have no noticeable effects on it and it is particularly resistant to aging.

KOROSEAL

KYS-ITE

Its chief characteristic, however, is its resistance to corrosives. This has led to its use as an insulator in plating racks where oxidizing acids are particularly harmful to most materials.

Oils are said to have little effect on Koroseal compounds. Because of this it may be used as gaskets and the like. It is also used in weather proof materials because of its resistance to sunlight and water.

Among the substances which do affect Koroseal are the following: acetic anhydride, aliphatic and aromatic ketones, aromatic amino compounds, lacquer solvents and organic halides. Organic compounds containing the nitro group also affect Koroseal adversely.

Uses:

Coatings for oil and gas pipes, tubing for piping chemicals, transparent beer tubing, acid and gas resistant fabrics, gas masks, wire and cable insulation, flame-proofing.

In the form of a spongy material it may be used in shock absorbers.

It may also be used as conveyor belts, wallets, belts, suspenders, raincoats, shower caps, aprons, etc.

KREMnitz WHITE

See Cremnitz White.

KREMS WHITE

See Cremnitz White.

KRYOLITH

See Cryolite.

KYS-ITE

Trade name for a Durez-resin impregnated wood pulp which is claimed to have a higher impact strength than plastic molding compounds.

L

LAC

See Shellac.

LACTIC ACID $\text{CH}_3\text{CHOHCHOHCOOH}$

A thick liquid, yellow or colorless.

Properties:

Specific gravity 1.2485

Melting point 18°C .

Boiling point 119°C .

Solubility:

Soluble in water, alcohol, ether.

Uses:

A substitute for citric acid in food and drink products.

A substitute for tartaric acid in culinary products.

LACTOFIL

Trade name for a casein synthetic fiber manufactured in Holland.

LANITAL

Trade name for a synthetic casein fiber manufactured in Italy.

LARD (Adeps)

A purified internal fat of the hog. It is a soft mass with a faint odor and a bland taste.

Solubility:

Soluble in ether, chloroform, benzene, carbon bisulfide.

Uses:

Cooking, perfumery.

Properties:

Cottonseed oil in the solid state.

LAMINATED PLASTICS

There are various and multifarious uses for laminated plastics. Because they keep their appearance irrespective of burning cigarettes, spilled alcohol, cleaning compounds or hard knocks, they make excellent table tops, paneled drinking fountains, walls, and many other applications. Such table tops are also satisfactory in the laboratory where they may be subjected to the corrosive action of acids and

LAMINATED TALC

alkalies. Wainscoting, walls, office furniture, ceilings, bedroom furniture, etc., are just a few of the articles which have been manufactured from this new synthetic material.

As substitutes for wood plastics have not experienced any difficulty in meeting all the physical, chemical and electrical requirements set up for them. They are easy to keep clean and they maintain a permanence of finish that exceeds the qualities of other surface coating materials.

LAMINATED TALC

See Mica.

LANOLIN

A white or slightly colored amorphous grease which is obtained from sheep's wool.

Solubility:

Soluble in ether, chloroform.

Slightly soluble in alcohol.

Uses:

In the manufacture of rosin soaps and toilet soaps.

In leather dressing, finishing, softening, etc.

Pomades and toilet preparations.

Cosmetics.

LANTHANUM TRIOXIDE

Substitutes:

Sublan.

LANTHANA

See Lanthanum Oxide.

LANTHANUM OXIDE (Lanthana, Lanthanum Trioxide, Lanthanum Sesquioxide) La_2O_3

A white amorphous powder.

Properties:

Specific gravity6.41

Solubility:

Soluble in acids.

Slightly soluble in water.

Uses:

Substitute for lime in calcium light.

LANTHANUM SESQUIOXIDE

See Lanthanum Oxide.

LANTHANUM TRIOXIDE

See Lanthanum Oxide.

LASTICS

See Rubber, Synthetic.

LAUREL CAMPHOR

See Camphor.

LAURYL ALCOHOL

When used as a wetting agent in textile and shearing processes sulfonated lauryl alcohol may be replaced by tetrahydrofurfuryl alcohol and tetrahydrofurfuryl carbinol.

LAVOR CARANGA

See Agar-Agar.

LEAD Pb

A gray solid metal. It is soft, ductile, of low tensile strength. It is seldom found in the native state.

Properties:

Atomic weight207.22

Melting point327.4°C.

Boiling point1525-1620°C.

Solubility:

Soluble in dilute nitric acid.

Insoluble in water.

Uses:

It has been suggested that lead can be used in a great number of cases, thus saving critical materials. Among some of the suggestions may be included the substitution of antimonial lead for brass in drum trap covers and closet floor flanges. Copper, brass, zinc, iron and steel may be saved if lead is used as service, soil, waste vent pipes, flashings and shower pans. Lead base bearing alloys are being used instead of tin base alloys in ship construction, in diesel engines and in many other similar places. Lead-base die casting alloys are replacing zinc-base alloys for a great many purposes where high strength is not the important factor but where good casting qualities are. It has been found that lead-base alloys are generally superior for corrosion resistance.

Rubber in many industrial operations is being replaced by lead pipe and lead pipe linings because lead is so resistant to corrosion. Collapsible tubes made of lead are replacing tubes made of tin. Lead foil laminated wrappings are taking the place of packages made of more critical materials. Lead coatings are preserving much zinc, tin, cadmium and nickel, formerly used to protect iron and steel products.

It has been suggested that considerable savings of critical materials may be made in the paint field by substituting lead pigments. For metal priming, red lead and blue lead can be used to conserve zinc and chromium. Pure white lead could be used instead of zinc for finish coats on metals and for wood painting.

Lead alloy couplings have been used instead of copper and bronze in certain types of cement-asbestos pipes.

LEAD MONOXIDE

The metal parts for mechanical pencils are now being made of lead alloy. It has been found that lead absorbs x-rays. Lead in the form of lead silicate in glass retains this property. Because of this lead glass have become of great importance as shields for the operators of x-ray tubes and machines.

LEAD MONOXIDE

See Litharge.

LEAD CLEATE

A white mass of granules which is poisonous. It is obtained when lead acetate and sodium oleate are allowed to react with each other.

Solubility:

Insoluble in water.

Soluble in alcohol, ether, turpentine, benzene.

Uses:

As a substitute for aluminum oleate as a drier for paints.

LEAD OXIDE, RED (Red Lead, Minium, Plumbo-plumbic Oxide) Pb_3O_4

Red powder.

Properties:

Specific gravity8.32-9.16

LEAD PROTOXIDE

Melting point
decomposes 500-530°C.

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

In protective paints. Substitute for litharge in making acid-resisting cements.

In rust-preventing prime coatings.

It is used as a base material in making flint glass. It is also used in the manufacture of automobile lamp lenses, camera lenses, cut glassware and optical lenses.

Substitutes:

Graphite, iron oxide, leaded zinc oxide, micaceous iron, titanium dioxide, white lead, jowitzite may all serve as substitutes for red lead in protective paints.

In rust preventing paints the following may substitute for red lead: silicon-aluminum alloys, zinc tetroxychromate, osmal finishes.

Litharge may be used as a substitute for red lead in the manufacture of flint glass, automobile lamp lenses, camera lenses, cut glassware and optical lenses.

LEAD OXIDE, YELLOW

See Litharge.

LEAD PROTOXIDE

See Litharge.

LEAD RESINATE

A poisonous yellowish-white paste. It is obtained when a solution of lead acetate and rosin oil are heated together.

Solubility:

Insoluble in practically all solvents.

Uses:

As a substitute for aluminum oleate as a waterproofing agent and as a paint drier.

Since aluminum stearate is also used as a waterproofing agent this product may be used as a substitute for aluminum stearate.

LEAD SILICATE $PbSiO_3$

A crystalline, white powder which is obtained by the reaction between lead acetate and sodium silicate.

Solubility:

Practically insoluble in most solvents.

Uses:

In the fireproofing of fabrics it may be used in place of borax.

It is also used in ceramics as an ingredient of enamels and glazes.

It is a raw material in glass making.

In the paint and varnish industry it is used as a white pigment in combination with lead sulfate.

LEAD STEARATE

A white powder obtained as a product of the reaction between a solution of lead acetate and sodium stearate.

Solubility:

Soluble in alcohol and ether.

Uses:

As a substitute for aluminum oleate as a drier for paints.

LEATHER

Many substitutes have been suggested for leather.

Fabikoid is one of the early substitutes. Another is artificial leather which is obtained by coating fabrics with a solution consisting of a mixture of pyroxylin and castor oil. Some other oil may be used in place of castor oil. When the solvent evaporates there remains a tough flexible coating. Onvo V is a trade-named product which has been suggested as a substitute for leather. Impregnated fibers and paper are being investigated and tested. In some cases plywood and plastics may be used instead of leather. And as a final resort wood is applicable.

An artificial leather derived from pumpkin has recently been announced.

LECITHIN

A constituent of brain substance. It contains phosphorus. It is obtained from egg yolk or cereal grain. It is a yellowish-white waxy mass.

LEIOCOM

Solubility:

Soluble in alcohol, ether, chloroform.
Insoluble in awter.

Uses:

A substitute for egg yolk in the manufacture of ice cream, candies and similar food products.

LEIOCOM

See Dextrin.

LEMONGRASS OIL (Verbena Oil)

A light yellowish liquid with a fragrant odor. It is obtained by distillation from the grass, *Andropogon citratus*. It contains citral to the extent of 70-85%.

Properties:

Specific gravity0.895-0.905
Refractive index1.482-1.489
(20°C.)

Solubility:

Soluble in alcohol, ether, benzene, acetone and chloroform.

Uses:

As a substitute for citral it is used in the manufacture of flavors, perfumes and lemon extracts. It is also used in the preparation of ionone.

It has been found useful as an odorant and as a source of citronellal.

LEUCONINE

Substitutes:

Oil of *leptospermum citratum*.

LETHANE 145

Trade name for an insecticide which may be used as a substitute for pyrethrum.

LEUCITE

A natural form of potassium-aluminum silicate which is found in lava. It is either white or gray in color with a vitreous or pearly luster. On analysis it has been found to contain 19.5% potash.

Properties:

Specific gravity2.45-2.50

Uses:

Since Italy is the most abundant source of this material the Italians have successfully worked it for potassium by means of the hydrochloric acid method. It is also found in the United States and because of its potassium content it is an interesting possible future source of potash.

Leucite also contains aluminum and may therefore serve as a substitute for bauxite in the manufacture of aluminum.

LEUCONINE

See Leukonin.

LEUKONIN (Leuconine)

Trade name for a compound of anti-mony which is said to contain 98% sodium metantimoniate.

It has been suggested as a substitute for tin oxide in enameling.

LIGHT MAGNESIA

See Magnesium Oxide.

LIGHT MAGNESIA CARBONATE

See Magnesium Carbonate.

LIGNITE WAX

See Montan Wax.

LIGNO-NEOPRENE

Trade name for a new synthetic material said to have been developed to seal under conditions not now satisfactory serviced by rubber, cork, paper, etc. It is claimed to possess compression qualities not found in ordinary rubber. It is resistant to oils, gasoline, kerosene, etc.

LIGNOFIL

A German substitute for hard tropical woods.

LIGNOFLEX

Trade name for a synthetic gasket material containing a high percentage of lignin. It is said that all the ingredients are of domestic origin.

It is claimed that this material is practically unaffected by oil, gasoline, naphtha and other petroleum products. It possesses a resiliency comparable to that of rubber itself. After its final processing, the material has the ability to actually compress like cork rather than to merely flow like rubber.

Uses:

As a gasket material.

LIGNOLITE

Trade name for a laminated plastic board. It is claimed that this board does not warp, that it can be machined, and that it is impervious to moisture, oil, grease and dilute acids.

Lignolite is used as a substitute for magnesium when used as pattern plates.

LIGNUM VITAE

See Guaiac Wood.

LIME

See Calcium Oxide.

LIME, HYDRATED (Slaked Lime, Calcium Hydroxide, Calcium Hydrate)

A dry powder consisting essentially of calcium hydroxide or a mixture of calcium hydroxide, magnesium oxide and magnesium hydroxide. It is obtained when quicklime is treated with water.

It is used in the building industry for the preparation of mortar, as a fluxing agent and for wire drawing.

LIME NITROGEN

See Calcium Cyanamide.

LINALOOL OIL

A colorless liquid with an odor similar to that of bergamot oil and French lavender.

Properties:

Specific gravity0.873

Boiling point195-199°C.

Solubility:

Soluble in ether and alcohol.

Uses:

Perfumery.

Substitutes:

Shiu Oil.

LINNEN SEED OIL

See Linseed Oil.

LINOLEUM

A mixture of oxidized linseed oil, rosin and powdered cork are heated together. The mass which results is pressed while hot to a canvas backing. If colors are mixed with the batch various colors are obtained.

Substitutes:

Asphalt tile has been used in place of linoleum and it is claimed that for some applications it is superior to the original product. Plastics, plywood, porcelain etc. have been used as substitutes for linoleum.

LINSEED OIL

(Boiled Oil, Linnen Seed Oil, Flaxseed Oil)

A natural liquid which is golden-yellow, amber or brown in color with a peculiar odor and a bland taste. It is an oil which thickens on exposure to air. In this process it darkens and acquires a pronounced taste. It is inflammable. The oil is obtained from the seeds of the flax plant.

Properties:

Specific gravity 0.932-0.935.

Saponification value 189-195

Iodine value 170-188

Solubility:

Soluble in ether, chloroform, amyl acetate, carbon bisulfide, benzene, turpentine.

Insoluble in alcohol.

Uses:

In the manufacture of patent leather.

As a color-retaining drying oil.

In the manufacture of paints.

In the manufacture of linoleum and oilcloth.

Substitutes:

Menhaden Oil.

Pentaerythritol ester of fractionated soybean oil fatty acid.

Hyptis seed oil.

Tall oil in conjunction with glycerin.

Rosin.

Perilla oil.

Soybean oil.

Sardine oil may be used in place of linseed oil in the manufacture of linoleum and oilcloth.

LIQRO

Trade name for a grade of tall oil.

LIQUID CAMPHOR

See Camphor Oil.

LIQUID PARAFFIN

See Petrolatum, Liquid.

LITHARGE (Lead Oxide, Plumbus Oxide, Lead Protoxide, Lead Monoxide) PbO

Yellowish to yellowish-red powder which is crystalline.

Properties:

Specific gravity9.53

Melting point888°C.

Boiling pointat white heat

Solubility:

Soluble in acids and alkalies.

Uses:

In the patching of acid tower linings.

It may be used as a substitute for red lead in the manufacture of automobile lamp lenses, optical lenses, camera lenses, cut glassware and flint glass.

In the manufacture of acid-resisting cements.

Substitutes:

Penchlor cement.

Red lead in the manufacture of acid-resisting cements.

LITHIUM Li

A soft silvery metal which must be stored under naphtha or kerosene.

LOCUST BEAN GUM

LUCITE

Properties:

Specific gravity0.534

Melting point186°C.

Boiling point1400°C.

Solubility:

Soluble in acids.

Decomposes water.

Uses:

Substitute for manganese in the manufacture of steel.

LOCUST BEAN GUM (Tragacanth)

A gum obtained from the seeds of the carob tree which is found around the Mediterranean Sea from Spain to Palestine.

Uses:

Sizing agent in textile manufacturing.

Substitutes:

Sodium alginate.

LONDON WHITE

See Cremnitz White.

LUBRICATING GREASE

Much attention has recently been given to the fact that lubricating grease has

not been used in the launching of many ships. It has been found that bananas as such serve the same purpose with equal efficiency.

LUCITE

Trade name for a synthetic methyl methacrylate resin which is available in the form of sheets, rods, tubes, molded sheets, and compression and injection molding powders. It is a thermoplastic material, crystal clear unless pigmented.

Products made from Lucite are claimed to be clear, light in weight, flexible, strong, durable. They undergo practically no shrinkage, they are moisture resistant and unaffected by alkalies, oils, dilute acids and dilute alcohols. They are light resistant and weather resistant.

The resin can be cut, turned, sawed, carved, drilled, polished, swaged and otherwise shaped. It is said that it may be cemented to itself, or to pyroxylin plastics and that it will take lacquers and stains of the correct type.

One of its characteristic properties is its ability to transmit or carry light through its own curves. It will also transmit ultra-violet light.

Uses:

Airplane windshields, store fronts, display fixtures, light panels, medical and dental appliances, costume jewelry, industrial parts, furniture, reflectors, containers, automobile parts, edge-lighted radio parts, signs, brush backs, lenses, etc.

LUMAPANE

Trade name for a plastic-impregnated wire screen which is claimed to pass more ultra-violet light and less heat than window glass. It is very transparent.

It is slightly more expensive than window glass but half the price of safety glass which it exceeds in breakage resistance and protective power.

Lumapane can be used to replace glass in plants, offices and houses and partitions that may be subject to explosions, bombing and other hazards.

LUMARITH

Trade name for a plastic which is prepared from cellulose acetate. It is essentially a solid solution of cellulose acetate with plasticizers.

It is available either pigmented or without coloring matter, in the form of molding powders, sheets, rods, tubes, or films.

Properties:

Specific gravity1.27-1.37

Refractive index1.49-1.50

Burning rateslow

Tensile strength

 sheets 6000-11000

 molding powder 2200-14000

Water absorption1.5-3.0%

Effect of ageslight

Solubility:

Decomposed by strong acids. Weak acids have slight effect.

Decomposed by alkalis.

Soluble in some ketones.

Slightly soluble in alcohol.

Insoluble in hydrocarbons such as gasoline, toluene, etc.

Insoluble in mineral oils.

Uses:

Automobile steering wheels, automobile interior decorations, lamp-shades, lighting accessories, airplane cockpit enclosures, decorative novelties, transparent containers, fountain pens, electrical appliances, spectacle frames, protective goggles, instrument and radio panels, dials and controls, costume jewelry, x-ray films etc.

LUPAMIDES

These are polyamides marketed in Germany and it is claimed that when this material is raked it has a tensile strength equal to that of light metals. Its chemical resistance is said to be lower than that of other thermoplastics and its water absorption rate is high. However it is claimed that these materials can be easily worked. Lupamide 85 B is being used as a substitute for leather.

LUSTRON

Trade name for a thermoplastic injection molding material which is claimed to be characterized by its resistance to acids, alcohols, and alkalis. Its water absorption is zero and it possesses extremely high electrical insulating properties, high dimensional stability, ready moldability, low unit weight, and crystal transparency.

It is said to be a polystyrene.

LUSTRON

Properties:

Specific gravity1.054-1.070
Refractive index1.59
Tensile strength5000-9000 lbs
 per sq. in.
Softening point190-230°F.
Effect of agevery slight

Solubility:

Soluble in aromatic and chlorinated hydrocarbons.

Insoluble in strong and weak acids.

Insoluble in strong and weak alkalis.

Uses:

Interior refrigerator parts, liquor pourers, soap dishes, acid-lead type battery cases, airplane instrument panels, magnifying glasses, toilet ware, containers.

M

MACASSARGUM

See Agar-Agar.

in the manufacture of artificial stone, brick and plaster tiles, and as a textile finishing agent.

Substitutes:

MAGNESIA

Dolomite.

See Magnesium Oxide.

MAGNESIUM Mg

MAGNESIA ALBA

See Magnesium Carbonate.

A moderately hard silvery, malleable metal. It is stable in dry air but in moist air it is oxidized and it tarnishes. It can be ignited when in a finely divided state and it then burns with an intense white light.

MAGNESITE $MgCO_3$

A magnesium carbonate found in nature. It occurs in various colors ranging from white to brown, with a dull vitreous luster.

Properties:

Specific gravity1.69-1.75

Melting point650°C.

Boiling point1120°C.

Properties:

Specific gravity3-3.12

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

In the manufacture of basic linings for furnaces.

Uses:

As a raw material in the manufacture of sord cement, ceramics, magnesium salts and carbon dioxide. An ingredient of disinfecting powders, fireproofing compositions, filler in paints and pigments, stabilizer in the manufacture of celluloid,

As a substitute for zinc in toxicological analyses.

As a substitute for zinc in dry batteries. This gives a higher e.m.f.

MAGNESIUM CARBONATE

It can, in part, replace aluminum in aircraft construction, bomb casings, incendiary bombs, etc.

Magnesium is never used alone in construction work but always as an alloy. It is usually alloyed with aluminum and the alloys thus formed are called Dow-metals.

Magnesium is also used as pattern plates.

Substitutes:

Lignolite may replace magnesium as pattern plates.

It has been suggested that olivine may be used as a potential sources of magnesium.

MAGNESIUM CARBONATE (Light Magnesium Carbonate, Magnesia Alba) $MgCO_3$

A very light, white crystalline powder.

Properties:

Specific gravity3.04

Melting point
decomposes at $350^{\circ}C$.

Solubility:

Soluble in dilute acids.

Insoluble in water.

Uses:

In the manufacture of rubber, as a reinforcing filler.

Substitute for activated carbon.

MAGNESIUM OXIDE

Substitutes:

A precipitated silica treated with a magnesium salt.

MAGNESIUM OLEATE

A yellowish mass obtained in the reaction of magnesium chloride and sodium oleate.

Solubility:

Soluble in linseed oil.

Insoluble in water.

Uses:

As a substitute for aluminum oleate as a drier for paints.

MAGNESIUM OXIDE (Magnesia, Light Magnesia, Burnt Magnesia, Heavy Magnesia, Calcined Magnesia) MgO

A white powder, its weight depending on the source.

Properties:

Specific gravity3.22

Melting point $2800^{\circ}C$.

Solubility:

Soluble in acids and ammonia salts.

Insoluble in water.

MAKALOT

Uses:

A substitute for platinum, when in the form of rods.

A substitute for asbestos in heat insulation and pipe covering. It may also be used in the manufacture of refractories, as an ingredient of various types of cements and adhesives, as a filler in the manufacture of paints, varnishes and lacquers, in cosmetics, artificial stone, etc.

MAKALOT

Trade name for a series of synthetic resins which are of the phenol-formaldehyde type. They are thermosetting. These products are also available in the form of varnishes and molding compounds.

Uses:

In the manufacture of telephone cabinets, bottle and tube caps, boxes, trays, buttons, handles, ash trays, bobbins, etc. They may be used for electrical insulators, water and acid-resistant parts, heater plugs, frictionless bearings.

MALT DIASTASE

See Solvamy.

MANGANESE

A silvery, brittle metallic substance. It is never found in the native state.

MARENG CELLS

Properties:

Specific gravity7.42

Melting point1225°C.

Boiling point1900°C.

Solubility:

Decomposes water.

Uses:

An alloying metal in steel making.

Substitutes:

Lithium, titanium.

May use spiegel or silico-spiegel in place of manganese in steel. However, these cannot be used in steels which must be low in carbon or phosphorus content due to their high content of these two elements.

It has been found by the British that soda serves effectively as a substitute for manganese in desulfurizing steel.

MARENG CELLS

It has recently been suggested that box cars, ordinary motor trucks and wooden barges may be converted into tank cars by the use of synthetic rubber bags. These may then be used for gasoline transportation. These cells were originally designed to carry gasoline in military airplanes. It is said that they may be stuffed into a small opening in the wing and subsequently filled with fuel. The cell expands to fill the entire wing capacity.

MASONITE

A patented process for the manufacture of wood composition board by exploding wood chips of 1000 lbs. per square inch. It is claimed that Masonite is superior in some ways to the boards from which the chips would have been waste products. The action not only explodes the wood chips but has a definite chemical action on the constituents of the wood.

Masonite has been suggested for use in refrigerators to replace metals. It is claimed to be 10% more efficient than its metal counterpart. In the lighting field industrial fluorescent lighting reflectors are made of Masonite reflector Board which is a semi-plastic.

This product has also been successfully used in replacing the copper sheets used in linings for vats, for save-all trays, and stock spouts. Galvanized iron splines are replaced by Masonite. It has been suggested for use in place of steel plate for cylindrical chip storage tanks.

Masonite Die Stock, a semi-plastic material weighs about one sixth the weight of steel. It is being used for the shearing and forming of dies. Hardwoods and metals are being replaced by Masonite Die Stock for assembly jigs and cradles, routed dies and templates, pressure ring dies, mating dies, etc. All these were formerly tooled from the highest grades of tool steel.

In the field of communications, it is being used to replace rubber and certain types of flat sheet plastics.

MASSLIN

Trade name for a new cotton cloth which is said to be manufactured like paper. It is claimed that it does not require any weaving or spinning.

MAZEIN FIBER

A synthetic fiber manufactured from zein. It has been reported that its strength when wet is greater than the strength of synthetic cellulose fiber. It has also been claimed that its elasticity is good and that it can be pigmented.

MEADOL

Trade name for a commercial, purified alkali lignin. It is said to be a lignin by product obtained in the manufacture of soda pulp from deciduous wood.

Solubility:

Soluble in organic solvents, and in dilute alkalis.

Insoluble in water and dilute mineral acids.

Uses:

It can be used as a thermoplastic binder.

It can also be used as an expander in the negative plates of storage batteries.

MECCA GALLS

See Galls.

MEEHANITE

MEEHANITE

A ferrous alloy which contains 2-3% carbon, 1-24% silicon, 0.1% phosphorus, 0.04-0.14% sulfur, all in addition to the iron.

It is being used extensively by industry in place of steel coatings, forgings, and alloyed materials.

MELAMINE RESINS

The newest of the thermosetting resins. These are synthetic resins which are condensation products of formaldehyde and melamine. Their preparation is similar to the preparation of the ureaformaldehyde resins.

These resins are characterized by their high heat resistance, their high speed of conversion and their stability to color. They cure quickly at relatively low temperatures.

Light colored, translucent panels are made from this resin. They are used for the inside of household refrigerators. They are also used in baking enamels. When used in combination with alkyds they produce a hard enamel at low temperatures. This is claimed to show good resistance to water, alkalies, fats, etc. When combined with cellulose pulp a light-weight tableware can be produced which is claimed to be hard, durable, resistant to weak alkalies and acids and all the ordinary solvents. It is also said to be an excellent insulator. It is thus suitable for electrical uses, particularly light fixtures, handles for hot pans, etc.

This resin is now being used extensively as a binder for laminated plastics. When

MENHADEN OIL

alpha cellulose is used as a base light, translucent pieces are formed. Melamine resins are also being used in the manufacture of synthetic crockery for the Navy.

MELMAC

Trade name for a series of synthetic melamine-formaldehyde resins. These resins are of the thermosetting group. Their chief characteristics are their exceptional baking speed, their hardness, color retention and their compatibility with a great number of other film forming materials.

These resins are used for surface coatings and for plastics.

MENHADEN OIL (Pogy Oil, Mossbunker Oil)

A yellowish-brown or reddish-brown liquid with a characteristic odor.

Properties:

Specific gravity	0.927-0.933
Iodine value	139-180
Saponification value	190.6
Refractive index	1.480

Solubility:

Soluble in ether, benzene, naptha, carbon bisulfide.

MERCURY FULMINATE

Uses:

Substitute for linseed oil in paints and linoleum.

MERCURY FULMINATE $\text{Hg}(\text{CN})_2$

A dark brown crystalline powder which explodes when dry.

Properties:

Specific gravity4.42

Melting pointexplodes

Solubility:

Soluble in alcohol, ammonium hydroxide, hot water.

Slightly soluble in cold water.

Uses:

Primer to set off the main charge in explosive shells.

Substitutes:

Lead azide.

Nitromannite.

MERSBLO

Trade name for a substitute blown castor oil.

Properties:

Acid number42

Iodine value45 Wijs

Viscosity1200 Saybolt at 210°F.

META DIHYDROXYZENZENE

Solubility:

Soluble in alcohol and mineral spirits.

Uses:

Plasticizer for lacquers.

Plasticizer for polishing compounds.

Plasticizer in putty and caulking compounds.

MESITOL (Mesitylene Alcohol) $(\text{CH}_3)_3\text{C}_6\text{H}_2.\text{OH}$

Colorless crystals.

Properties:

Melting point69°C.

Boiling point220°C.

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

A substitute for orthocresol as a gum inhibitor in cracked gasoline.

MESITYLENE ALCOHOL

See Mesityl.

META DIHYDROXYBENZENE

See Resorcinol.

METAL CANS

METHYL ALCOHOL

METAL CANS

Metal in cans are replaced with fiber bodies made on the same machinery used in the manufacture of the metal containers. A processed paper is used instead of the metal.

METALLAC

Trade name for zinc stearate of a special grade. It may be used to replace aluminum stearate where jellying occurs. This product is claimed to prevent this jellying. It may be used in the manufacture of flat paints and varnishes.

METHALATE C

Trade name for a substance which possesses an odor similar to methyl salicylate and for which it may be used as a substitute.

METHANAMIDE

See Formamide.

METHANECARBOXYLIC ACID

See Acetic acid.

METHANOL

See Methyl Alcohol.

METHENAMINE

See Hexamine.

METHENYL

See Ethyl Formate.

METHOCEL

Trade name for methyl cellulose. It is a colorless, tasteless, odorless and non-toxic white powder.

This product is soluble in water. Its aqueous solution is clear and viscous. It is used in adhesives, as a size in paper manufacture and in alkyd emulsion paints.

Methocel may be used to replace gums in textile printing and in the manufacture of pencils and crayons where it is used as a binder for the pigments.

METHYL ALCOHOL (Methanol, Wood Alcohol, Wood Spirit, Wood Naphtha, Methyl Hydroxide, Methyl Hydrate, Columbian Spirits) CH_3OH

Clear, colorless liquid which is volatile and inflammable.

Properties:

Specific gravity0.7913

Melting point-97.8°C.

Boiling point66.78°C.

Refractive index1.329 (20°C.)

METHYL AMYL ACETATE

Solubility:

Soluble in water, alcohol and ether.

Uses:

As a refrigerant.

Substitutes:

Ethyl-potassium phosphates.

Methyl-potassium phosphates.

Neutralized alkyl phosphates.

METHYL AMYL ACETATE (Methyl Isobutyl Carbinol Acetate)

A colorless liquid with a mild agreeable odor.

Properties:

Specific gravity0.8565 (20°C.)

Boiling point145.9°C.

Flash point105°F.

Uses:

It is claimed that this solvent is a useful high-boiling solvent in lacquer and thinner formulation, being superior to amyl acetate and butyl propionate in bluish resistance. It is also claimed to be superior to these solvents for reducing the tendency of the lacquer film to peel and for eliminating swelling or lifting of the oil base undercoats.

METHYLBENZENE

See Toluene.

METHYL CELLOSOLVE

METHYL BROMIDE (Bromomethane) CH3Br

A colorless liquid which resembles chloroform in odor. It is obtained as a product of the reaction between bromine and methyl alcohol in the presence of phosphorus.

Properties:

Specific gravity1.732 (0°C.)

Boiling point4.6°C.

Melting point-84°C.

Dielectric constant 0.0068 (100°C.)

Solubility:

Soluble in most organic solvents.

Uses:

In place of carbon tetrachloride as a refrigerant.

It is also useful in organic synthesis and as a low-boiling solvent.

METHYL CELLOSOLVE

Trade name for ethylene glycol monomethyl ether. A colorless, stable liquid with a mild agreeable odor.

Properties:

Boiling point124.5°C.

Specific gravity0.9748 (15°C.)

Refractive index1.4028 (20°C.)

METHYL CELLULOSE

Solubility:

Miscible with water, hydrocarbons, alcohols, ketones, glycols.

Uses:

Moisture proof transparent wrapping materials are sealed with this product. A complete seal is given because of its non-tackiness which permits it to flow into all corners of a fold by means of a wick. It is claimed that unlike glue it does not adhere to the sealing machine, that it can be left indefinitely without gumming, and that it eliminates the necessity of glue-pot cleaning.

METHYL CELLULOSE

A non-inflammable film which is grease-proof and which retains its flavor. Organic acids do not affect it.

It has been reported that edible starches can be replaced by methyl cellulose adhesives. It is claimed that these adhesives are superior to starches and dextrines. They appear upon the market under various trade names such as Tylose, Coloresin and Glutolin.

These products are useful in soapless detergents, knife glazes, pore fillers, emulsion and cream bases and adhesives. Because of the fact that the adhesives prepared with methyl cellulose have a low water content and therefore possess a high adhesive power, these adhesives are especially applicable to such heavy work as wall covering, book binding and in the manufacture of cartons. The solutions of methyl cellulose are also useful in thickeners, in binders and in sizings.

METHYL ETHYL KETONE

METHYL CHLORIDE (Chloromethane) CH_3Cl

A colorless gas which is easily liquefied. It possesses a characteristic odor. It is obtained by the action of hydrochloric acid on methyl alcohol in the presence of sulfuric acid.

Properties:

Specific gravity0.92 (20°C.)

Boiling point-23.7°C.

Melting point-97.6°C.

Critical temperature.....143°C.

Critical pressure970 lbs. per
sq. in.

Solubility:

Soluble in water, chloroform, alcohol.

Uses:

As a refrigerant it may be used to replace carbon tetrachloride.

In medicine it is claimed to be a good local anesthetic.

METHYL ETHYL KETONE (Ethyl Methyl Ketone) $\text{CH}_3\text{COC}_2\text{H}_5$

A colorless liquid with a typical ketonic odor. Its odor is less pungent than that of acetone. It possesses high solvent power for nitrocellulose but it is not a solvent for most types of cellulose acetate. It is very stable and cannot hydrolyze to form acids. It is, therefore, inert to metals.

METHYL HYDRATE

Properties:

Specific gravity	0.808
Boiling point	79.6°C.
Refractive index	1.3791 (20°C.)
Flash point	-7.2°C.
Dielectric constant	18.4

Solubility:

Soluble in water, alcohol, ether.

Miscible with oils.

Miscible with the usual nitrocellulose lacquer solvents and diluents.

Uses:

It is being used to replace the ester solvents of similar evaporation characteristics in the manufacture of base lacquers and lacquer thinners. The substitution of methyl ethyl ketone for the esters enables an increase in the amount of solids per unit volume of lacquer.

METHYL HYDRATE

See Methyl Alcohol.

METHYL HYDROXIDE

See Methyl Alcohol.

METHYL ISOBUTYL CARBINOL ACETATE

See Methyl Amyl Acetate.

METHYL METHACRYLATE RESINS

METHYL ISOBUTYL KETONE $(CH_3)_2CHCH_2COCH_3$

A colorless stable liquid.

Properties:

Boiling point	118°C.
Freezing point	-84.7°C.
Specific gravity	0.8017 (20°C.)

Solubility:

Miscible with most organic solvents.

Uses:

It is claimed that because its evaporation rate is slightly faster than butyl acetate this product can be used in place of esters when less odor is desirable. It may also be used with esters to obtain a desirable solvent mixture.

METHYL METHACRYLATE RESINS

A series of synthetic resins which are characterized by their exceptional clarity. These resins are light stable and colorless.

Properties:

Density	1.2
Tensile strength	8000-11000 lbs. per sq. in.
Dielectric strength	700 volts per mil.

METHYLMETHANE

MICA

Uses:

As a molding powder to form solid resins.

As a lamination binder.

As ingredient of lacquers and adhesives.

Uses:

Flavoring, perfumery, polishes, printing and copying inks.

Substitutes:

Methalate C.

METHYLMETHANE

See Ethane.

METHYLPROPYLPHENOL

See Thymol.

METHYLPROTocatechuic ALDEHYDE

See Vanillin.

METHYL SALICYLATE (Synthetic Wintergreen Oil, Synthetic Gaultheria Oil) $C_6H_4OHCOOCH_3$

A colorless, oily liquid with an odor of wintergreen.

Properties:

Specific gravity1.1850

Melting point-8.3°C.

Boiling point222.2°C.

Solubility:

Soluble in alcohol and ether.

Slightly soluble in water.

MICA (MUSCOVITE, LAMINATED TALC)

A group of mineral silicates with varying composition. They readily separate into thin sheets which are rather elastic. They are crystalline in structure. Only two of them are of commercial importance, muscovite and phlogopite.

Uses:

Electrical insulation, substitute for glass in stove doors, goggles, gas masks, screens, windows, etc. When ground into a powder they may be used in paints, wall paper, tiles, lubricants, textile printing, oil-cloth and rubber fillers, etc.

It may also be used as a substitute for aluminum powder in the manufacture of paints.

Substitutes:

Alsifilm.

The imported varieties from India and Madagascar have been most suitable for electrical insulation but large quantities of mica from deposits in North and South America are now being used to replace the imported product.

It has been suggested that fiberglass may be used in place of mica for some of its applications.

MICARTA

MINERAL WAX

MICARTA

Trade name for a product which is said to be a paper or cloth laminated with a phenol-formaldehyde resin. It is claimed that it may be used as a substitute for nickel in the construction of corrosion-resisting equipment.

MILKWEED

Many important uses have recently been uncovered for this apparently insignificant plant.

It has been reported that milkweed floss may serve as an excellent substitute for kapok. The fibers are virtually identical. It may also serve as a substitute for cork.

Investigations have shown that the floss is warmer than wool and that it is six times lighter than that material. It can be felted like fur and thus turned into a feather-weight water-proof summer hat.

Milkweed seed oil is a semi-drying oil which may prove useful in the manufacture of paints and finishes.

This product should prove of great usefulness in paper making, rayon and explosives, textiles, wall board for heat insulation materials. The plastics industry should find some use for it because of its lignin content.

MINERAL CARBON

See Graphite.

MINERAL COTTON

See Mineral Wool.

MINERAL OIL

A name variously applied to crude petroleum, to the lubricating oils which are obtained from petroleum and to liquid petrolatum.

Uses:

Substitute for almond oil as a lubricant for delicate machinery parts.

MINERAL SPIRITS

A colorless liquid with a pleasant odor.

Solubility:

Specific gravity0.770-0.800

Refractive index1.42

Flash point86-105°C.

Uses:

Turpentine substitute.

MINERAL WAX

See Ceresin.

MINERAL WOOL

MIRASOL RESINS

MINERAL WOOL (Mineral Cotton, Silicate Cotton)

There are two types of mineral wool, slag wool, and rock wool.

Slag wool is obtained when steam or hot air is blown through molten slag. It is an intermingled mass of filaments grayish-yellow in color. Its heat conduction is poor. It is sound, fire and insect proof.

Rock wool is a fibrous mass obtained from limestone. It is listed as the most efficient fire-proof insulator known.

Uses:

Slag wool is used as a substitute for asbestos.

Rock wool is used in cold storage insulation, in boiler insulation, etc.

When in the form of felt mineral wool is useful as an insulating layer between metal fabrics.

A mineral wool board is on the market which is claimed to be excellent for cold storage insulation. It is said to possess good moisture resistance, to be self-supporting and to stay permanently placed without sagging, settling, shrinking, swelling or warping. It will not rot, mold, or harbor vermin. It is also free from any objectionable odor. This product is applied essentially the same as cork board.

MINERALITE SILICATE

An aluminum silicate mined in South Carolina. It is tasteless and odorless.

Properties:

Melting point2700°F.

Density2.62-2.75

Solubility:

Insoluble in water.

Unaffected by sulfuric acid, phosphoric acid, alkalis, organic solvents.

Hydrochloric acid is slightly discolored by it.

Uses:

Because of the fineness of mesh, its high heat resistance, its low moisture absorption and its high dielectric strength it is claimed to be suitable as a filler for plastics.

MINIUM

See Lead Oxide, Red.

MIRASOL RESINS

Trade name for a synthetic resin of the alkyd type. It is marketed in the form of drying oils, medium drying oil, non-drying oil, natural resins, phenolic and urea resins.

Uses:

In the paint industry, printing inks and textile finishes.

MODIFIED NATURAL RESINS

Glycerin modified natural resins or resin acids. Esters are usually formed by the reaction between the resin acid and the glycerin. The final product can be varied with respect to color, hardness, acidity and solubility. The resins obtained in this fashion are said to possess greater durability and resistance. When incorporated in a varnish formulation these properties are imparted to the film. One disadvantage is the fact that there is a greater inclination toward softness and tackiness.

MOLDEX

Trade name for a product which is carbinyol p-oxybenzoate. It is a powder which is tan in color.

Properties:

Melting point125-127°C.

Solubility:

Soluble in glycerin, ethyl alcohol, diethylene glycol.

Partly soluble in water.

Uses:

Substitute for benzoic acid as a preservative.

Preservation of water solutions and emulsions which contain gums, glue casein, starch, etc.

Preservative for cosmetics, textile preparations, etc.

MOLOCHITE

A china clay product used as a substitute for barium sulfate in the manufacture of rubber goods.

MOLYBDENUM Mo

A gray metal of high melting point.

Properties:

Specific gravity9.01

Melting point2535°C.

Boiling point3620°C.

Solubility:

Soluble in nitric acid, sulfuric acid, hydrochloric acid.

Insoluble in water.

Uses:

Substitute for platinum in contact-making and breaking devices. It is also used in place of tungsten in a new tough alloy for cutting steel with steel. It is said that this new alloy seems to work as well as the old tool steel and that it is less expensive.

MONEL METAL

A white metal containing 67% nickel, 28% copper and 5% other metals such as iron, manganese, silicon and carbon.

Properties:

Melting point1360°C.

MONOCALCIUM PHOSPHATE

MONTAN WAX

Solubility:

Unaffected by common salt solutions.

Comparatively inert with many chemicals although its resistance to acids is less than that of duriron.

Uses:

It can be drilled and tapped and handled in the machine shop as steel is. It may be drawn into wires and woven into cloth to be used in filtrations of alkaline slurries. In the pulp and paper industry it is used for water trays. Monel is also used in winding wires for cylinder moulds.

Substitutes:

In the paper industry, wooden white water trays may be used in place of monel.

Copper can replace monel for screen plates. It has been found however that the copper has a shorter life.

Silica bronze replaces monel in winding wires for cylinder moulds. Here, too, the life of the silica bronze is shorter than that of monel.

Paint or synthetic enamel and bronze or porcelain finishes are substitutes for monel metal.

MONOCALCIUM PHOSPHATE

See Activated Carbon.

MONOGLYCOLLIN

See Dibutyl Phthalte.

MONOSTEARIN

Trade name for the water insoluble form of glyceryl monostearate. It is a light, cream colored waxy solid, with a faint odor.

Properties:

Melting point55.5-56.5°C.

Specific gravity0.898 (58°C.)

pH (3%)6.7

Solubility:

Insoluble in water.

Soluble (hot) in alcohol, hydrocarbons, oils.

Uses:

It is suggested as a synthetic wax for waterproofing, insulation, polishes, dental waxes, etc.

Replaces shellac as an enteric coating for tablets.

Substitute for vegetable waxes in polishing and waterproofing materials.

MONTAN WAX (Lignite Wax)

When crude this wax is dark brown but for the industry it is bleached. In this state it is a white, amorphous, semi-soft wax, derived from lignite coal.

Properties:

Melting point80-90°C.

MORRHUS OIL

Solubility:

Soluble in carbon tetrachloride, benzene, chloroform.

Uses:

Substitutes for carnauba wax and beeswax.

Shoe polishes.

Furniture polishes.

Phonograph records.

Roofing paints.

Waterproof paints.

Adhesives.

Candles.

Substitutes:

Rezowax.

Candelilla.

Synprowax.

MORRHUS OIL

See Cod-liver Oil.

MOSSBUNKER OIL

See Menhaden Oil.

MOTOR BENZOL

See Benzene.

MUSCOVITE

MUCIC ACID (Saccharolactic Acid) $(\text{OH})_4\text{C}_4\text{H}_4(\text{COOH})_2$

White crystalline powder obtained by the oxidization of lactose with nitric acid.

Properties:

Melting point213°C.

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

As a substitute for potassium bitartrate in baking powder.

MUGOL

A colorless liquid with a lily-like odor.

Uses:

Substitute for hydroxycitronellal.

MUSCOVITE (Potassium Mica, White Mica, Muscovy Glass) $\text{KH}_2\text{Al}_3(\text{SiO}_4)_3$

A potash mica which is constituent of granite.

Properties:

Specific gravity2.76-3

MUSCOVY GLASS

Uses:

A substitute for aluminum powder in the manufacture of paints.

MUSCOVY GLASS

See Muscovite.

MUSK (Natural)

When fresh this is a brownish semi-liquid. When dried it is in the form of grains or lumps. It is reddish in color. It is secreted from the preputial follicles of the musk deer of Central Asia.

Solubility:

Soluble in water and alcohol.

Uses:

In perfumery.

Substitutes:

Abelmoschus.

Astrotone synthetic musk.

Muskrat gland secretion.

MUSK MALLOW

See Abelmoschus.

MUSK OKRA

See Abelmoschus.

MUSK SEED

See Abelmoschus.

MYCALEX

An inorganic plastic manufactured from ground mica and bonded with glass.

Uses:

Water tight terminal seals for electrical heating units.

Brushholder insulation for DC traction motors.

Aircraft spark plug connections.

Radio transmitters.

MYRTLE WAX

See Bay-berry Wax.

N

NAPTHA No. 54

Trade name for a narrow cut fraction which boils from 165-235°F. It is used as a benzol substitute.

NAPHTHALENE (Tar Camphor, Napthalin, White Tar) $C_{10}H_8$

White crystalline substance. Possesses a strong coal-tar odor. The flakes are volatile.

Properties:

Specific gravity1.145

Melting point80.05°C.

Boiling point217.96°C.

Solubility:

Soluble in benzene, ether and absolute alcohol.

Insoluble in water.

Uses:

Substitute for camphor.

Substitute for paraffin.

NAPHTHENIC ACIDS

A dark liquid with an unpleasant odor. It is a mixture of several acids obtained as a by-product of the refining of petroleum products.

Properties:

Boiling points120°C. (approx.)
12 mm. pressure)

Uses:

In rubber compounding.

Substitutes:

Capric acid.

Stearic acid.

NATIVE PARAFFIN

See Ozokerite.

NEOPRENE

Neoprene is the trade name for a polymer of chloroprene which first made its appearance in 1931. It is a synthetic latic. When first introduced it was known as Duprene.

Properties:

Specific gravity1.25-1.30

Tensile Strength1000-4500

Maximum temperature for use
300°F.

Effect of heatstiffens slightly

Abrasion resistanceexcellent

Effect of sunlightnone

Effect of aginghighly resistant

Machining qualities..can be ground

Although Neoprene is not rubber in the chemical sense it can be processed on

NEOPRENE

rubber machinery with nearly as much ease as natural rubber. If it is properly compounded and heated it polymerizes to a product which resembles natural soft rubber.

Neoprene is a basic thermosetting raw material which is mixed with the compounding ingredients and processed into the finished products by the rubber manufacturer. Several types of neoprene are available, each type with widely varying properties. It is marketed in black, white and colored, odorless when specified.

This synthetic lastic may be used in contact with inorganic chemicals. It is little affected by salts. Strong alkalies may be successfully handled with it. It deteriorates under the effect of mineral acids when they are in concentrations greater than 75%. It is suggested that strong oxidizing acids should be avoided.

Neoprene resists the attacks of most organic compounds. It is not recommended for use with the chlorinated hydrocarbons or with creosote. It has been found that certain aromatic solvents like benzol cause rapid swelling. It resists the action of oils, gasoline, etc.

Uses:

Because of its flame resistance it may be used as an outer sheath for electrical insulation.

Hose, beltings, packing, general mechanical goods, gaskets, tank linings where oil or high temperatures are encountered.

Neoprene was recently made available in a semi-liquid state. This may be used as a high solids paint or as a troweling compound.

Neoprene coated fabrics may be used for diaphragms, aprons, and hospital sheeting among other uses. When in the

NEVSOL

form of tape it may be used by airplane manufacturers to seal fuel tanks and water tight compartments. Cements made from neoprene may be used for bonding, impregnating and coating oil resistant products.

When properly compounded a special type of neoprene may be made so plastic that it can be smeared with a paint brush. It serves as an anti-corrosive lining for tanks of steel, wood and concrete.

NEROL

A colorless liquid which is an isomer of geraniol. It possesses a rose-like odor.

Uses:

Substitute for rose oil in perfumery.

NEVOLL

Trade name for a refined coal-tar oil which is used as a rubber extender.

NEVSOL

Trade name for a hydrocarbon solvent, high in aromatics, water-white in color.

Properties:

Specific gravity0.820-0.830

Uses:

Substitute for toluol.

NEWPORT ROSIN

Trade name for a wood rosin.

Properties:

Melting point53°C.

Acid number153

Saponification number164

Uses:

Substitute for linseed oil.

NICHROME

A ferrous alloy containing 60% nickel, 24% iron, 16% chromium, 0.1% carbon. Its principal use is restricted to electrical resistance purposes.

Nichrome wire can be conserved by changing to cast-iron grid resistors.

NICKEL Ni

A grayish-white, very hard metal which takes a very high polish.

Properties:

Specific gravity8.63

Melting point1452°C.

Solubility:

Soluble in dilute mineral acids.

Insoluble in water.

Uses:

Corrosion resistant stainless steel requires nickel, and chromium.

Armor plate requires a nickel steel.

Construction material for corrosion resisting tubing.

Nickel plating.

In interior decoration.

In oven racks.

Substitutes:

It has been suggested that silver can replace nickel for metal plating.

An extremely thin copper film, if buffed, should serve as a protection for steel almost as well as does nickel.

Manganese steels, molybdenum steels and low chromium steels can substitute for nickel in structural alloy steels.

The 18%-18% chromium-nickel alloys can be successfully replaced by straight chromium-iron alloys of 16%-18% chromium.

In the construction of corrosion-resisting equipment nickel can be replaced by Micarta.

Karbate products may also replace nickel in the construction of corrosion-resisting tubing.

There is such a shortage of nickel today that it is being spread more thinly. Nickel steels are being made with about 0.50% nickel instead of 3.50%. Hardness may be attained by a multiplicity of very small amounts of various elements.

The heat-resistant nickel-chromium alloys are being made with less nickel.

NICOTINE SULFATE

NITER CAKE

For corrosion-resistant service ordinary steel with a thin veneer of stainless can be used for structural purposes.

Iron can serve as a substitute for nickel with the proper engineering.

In decoration of interiors or for protection against corrosion a number of materials may be used. Among them are vitreous enamel or a specially prepared oxide coating which can be applied to steel or cast iron. Ceramic coatings may also be used. Indium plating is applicable in this case.

In oven racks the nickel may be replaced by plain steel finished in gun metal blue.

Brazil has a huge deposit of 5% ore which is, as yet, undeveloped. The Government is also investigating the low grade ores from Cuba.

NICOTINE SULFATE $C_{10}H_{14}N_2 \cdot H_2SO_4$

This liquid is usually available on the market in the form of a solution which contains 40% equivalent of nicotine.

Uses:

Substitute for rotenone as an insecticide.

NICOULINE

See Rotenone.

NIGRITE

A gutta-percha substitute. It is re-

ported to be made from the residue of the distillation of ozokerite which is compounded with rubber.

This material is a variety of asphalt.

NIPOCER

Trade name for a synthetic wax said to be manufactured from freely available domestic raw materials. It is tan in color.

Properties:

Melting point46-49°C.

Specific gravity0.935

Solubility:

Soluble (hot) in toluol, mineral spirits, mineral oil, vegetable oils, naptha.

Insoluble in water and alcohol.

Uses:

Substitute for Japan wax in many cases.

This product blends with Japan wax, paraffin wax, beeswax, carnauba wax, rosin, etc. It emulsifies readily with the usual emulsifying agents. The resulting emulsions are stable and smooth.

It is also used in textile preparation, in lubricants of various types, in protective coatings, in polishes and impregnants.

NITER CAKE

See Sodium Bisulfate.

NITRALIM**NITROETHANE****NITRALIM**

See Calcium Cyanamide.

NITRALIM

See Sodium Nitrate.

NITRATINE

See Sodium Nitrate.

NITROBENZENE (Oil of Mirbane, Oil of Myrbane, Essence of Mirbane, Essence of Myrbane) $C_6H_5NO_2$

Yellow crystals or oily liquid. It is poisonous.

Properties:

Specific gravity.....1.199

Melting point8.7°C.

Boiling point210.85°C.

Solubility:

Soluble in alcohol and ether.

Practically insoluble in water.

Uses:

In the manufacture of dyestuff intermediates.

Substitutes:

Orthonitrodiphenyl, technical.

NITROCELLULOSE (Pyroxylin, Gun Cotton)

An amorphous, yellowish mass which is odorless and tasteless.

Properties:

Specific gravity0.1-0.3

Solubility:

Soluble in ether, alcohol, ethyl acetate, nitrobenzene, benzene, acetone, amyl acetate.

Uses:

Explosives, collodion solutions, photographic films, lacquers, enamels, dopes, bronzing liquids, cements.

Substitutes:

Aceloid flakes.

Cinelin flakes.

NITROCHLOROFORM

See Nitrotrichloromethane.

NITROETHANE $C_2H_5NO_2$

A colorless liquid.

Properties:

Specific gravity1.052

Melting point-90°C.

NITROMANNITE

Boiling point114°C.
Flash point106°F.
Refractive index1.3916

Solubility:

Sparingly soluble in water.

Uses:

Solvent. See Nitroparaffins.

NITROMANNITE (Nitromannitol) $C_6H_8(NO_3)_2$

Very sensitive explosive which is liable to spontaneous decomposition.

Solubility:

Insoluble in water.

Uses:

Substitute for mercury fulminate as a primer in explosive shells.

NITROMANNITOL

See Nitromannite.

NITROMETHANE CH_3NO_2

A colorless liquid.

Properties:

Specific gravity1.139

NITROPARAFFINS

Melting point-29°C.
Boiling point101.2°C.
Flash point112°F.
Refractive index1.3818 (20°C.)

Solubility:

Sparingly soluble in water.

Uses:

Solvent. See Nitroparaffins.

NITROPARAFFINS

A new series of saturated hydrocarbons prepared within the past five years for the first time. Four of them are being manufactured and made available to the industry. These are nitromethane, nitroethane, 1-nitropropane and 2-nitropropane.

Properties:

Specific gravity0.992-1.139
Melting point-29 to -108°C.
Boiling point101.2-131.6°C.
Flash point103-120°F.
Refractive index1.3818-1.4015
(20°C.)

Uses:

Solvents. These may be used to replace the solvents for cellulose acetate, such as acetone or ethyl lactate and diacetone.

With the nitropropanes it has been possible to formulate cellulose acetobutyrate

I-NITROPROPANE

lacquers which are claimed to have excellent flow and which may contain any of a number of the common resins.

Solutions of the vinyl acetate-vinyl chloride co-polymers in the nitropropanes have a lower viscosity than the solutions of these polymers in the commonly used higher ketones. This means that less of the nitropropane is required than of a higher ketone to produce solutions of equal viscosities.

I-NITROPROPANE $\text{CH}_3\text{CH}_2\text{CH}_2\text{NO}_2$

A colorless liquid.

Properties:

Specific gravity	1.003
Melting point	-108°C.
Boiling point	132°C.
Flash point	120°F.
Refractive index	1.4015

Solubility:

Sparingly soluble in water.

Uses:

Solvent. See Nitroparaffins.

2-NITROPROPANE $\text{CH}_3\text{CHNO}_2\text{CH}_3$

A colorless liquid.

Properties:

Specific gravity	0.992
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NITROTRICHLOROMETHANE

Melting point	-93°C.
Boiling point	120°C.
Flash point	103°F.
Refractive index	1.3941

Solubility:

Sparingly soluble in water.

Uses:

Solvent. See Nitroparaffins.

NITROTRICHLOROMETHANE (Nitrochloroform, Chloropicrin, Trichloronitromethane) CCl_3NO_2

When pure this is a liquid which is slightly oily and colorless. It possesses a characteristic odor. In the crude state it is a yellow liquid, relatively stable and is not decomposed by water or mineral acids.

Properties:

Specific gravity	1.6597 (20°C.)
Boiling point	112°C.
Melting point	-69.2°C.

Solubility:

Soluble in alcohol, benzene, carbon disulfide.

Slightly soluble in ether.

Insoluble in water.

Uses:

As a fumigant for grain elevators.

Substitutes:

Furoyl Chloride.

NOPCO-WITE

Trade name for a sulfonated oil which is claimed to be exceptionally non-oxidizing in character. It is light in color and intended for use on various types of white leathers. It is said that no yellowing occurs even when exposed to strong light. When used in tanning it imparts a dry feel to the leather.

Uses:

In the processing of leather as a substitute for coconut oil and sperm oil.

NORBIDE

Trade name for boron carbide, which see.

NOREPOL

Trade name for a product obtained from soy bean oil, corn oil and other farm products. It was discovered in the Northern Regional Research Laboratory of the Department of Agriculture. No details are available on the chemical constitution or on the methods of producing it due to restrictions imposed by the Government.

This material is a rubber substitute. It is claimed to look, smell and act almost like natural rubber.

Properties:

Tensile strength300-865 lbs. per sq. in.

Tear resistance30-80 lbs. per in.

Elongation at break.....100-250%

Brittle point-23 to 40°C.

Uses:

It has been found that this product may be compounded and processed yielding a product which can be milled, calendered and vulcanized in conventional rubber processing equipment.

NOTOL No. 1

Trade name for a hydrocarbon solvent claimed to be high in aromatics. It is said that because its nitrocellulose tolerance is within 80% of that of toluene it may be used as a substitute with slight changes in formulation. It may also be used as a lacquer diluent.

NUCITE

Trade name for a glass chalkboard which is obtained by fusing to the face of polished plate glass a colored vitreous material hardened to resist the abrasion of chalk and eraser.

It is claimed that Nucite takes a chalk mark readily and yet may be easily and cleanly erased.

NULOMOLINE

NYLON

NULOMOLINE

Trade name for a pure food product which is an invert sugar. It is a plastic product consisting of levulose, dextrose and moisture.

Solubility:

Soluble in water, glycerin, glycols.

Slightly soluble in alcohol.

Uses:

Substitute for glycerin in food products.

NUTGALLS

See Galls.

NYLON

The generic name applied to all the superpolymers obtained from long-chain amino acids or from long-chain dibasic acids in combination with diamines. The chemical structure of nylons resembles that of proteins.

Nylon is crystalline in structure, practically non-inflammable and physiologically inert. It is resistant to mildew, molds, moths and enzymes. It is closer to silk in its chemical constitution and properties than any synthetic fiber manufactured previously, although it does not equal silk or wool in its resilience. Nylon may be

fabricated into many forms such as bristles, sheets and textile fibers.

Properties:

Crystalline; can be cold drawn; has high degree of true elasticity and great tensile strength; it is very tough; its melting point is fairly sharp; it does not flame—it simply melts; is very resistant to water; is resistant to dry-cleaning fluids; is resistant to sunlight; it is also resistant to mildew and moths.

Uses:

Stockings, surgical sutures, fishing leaders, brush bristles.

Practically all the bristles used in the country had been imported from China and Russia. The war cut off the supply. It has been found that Nylon bristles possess the required taper, resiliency, toughness, length and inertness to paint ingredients. In addition it has been reported that they wear at least three times longer than natural bristles.

The entire production of Nylon has now been taken over by the Government for fabrication into parachute cloth.

A recent use for Nylon is to replace Japanese silk threads which are scattered through the special paper stock used by the Federal Government in its paper money and securities.

Nylon fleece is being made from leftovers of war production. It may be used in coats, bath robes, and all kinds of blankets. Wool may be replaced in these items.

NYLON

One of the newest uses for Nylon has recently been announced. Natural leather may be replaced by a new development. By a slight change in the process of manufacture, sponge nylon and cord-like forms of the product could also be produced. These are not, as yet, commercially available.

It has been disclosed that screens made of Nylon will not rust or require painting. Single heavy strands are woven into strong, smooth screens through which a sharp-pointed pencil can be pushed without causing damage. The screens can be colored permanently by adding pigments to the molten nylon. The material is flexible and suitable for roll screens.

O

9:11 OCTADECADIENIC TRIGLYCERIDE

See Doboline Oil.

OIL FROM COAL

A comparatively new method for the production of oil from coal has been developed. By means of the Fischer-Tropsch method a number of separate fuel and lubricant products are obtained directly. This is an advantage over the Bergius method which yields a single liquefied coal. This must be treated further just as crude oil is treated in a regular refining process.

Much smaller plants are economically possible and less precision equipment is required. Furthermore, almost any type of coal may be used in the process.

OIL OF MIRBANE

See Nitrobenzene.

OIL OF MYRBANE

See Nitrobenzene.

OIL OF VITRIOL

See Sulfuric Acid.

OIL WHITE

Mixtures of lithopone and white lead or zinc white. Gypsum, magnesia, whiting or silica may also be contained in the mixture.

It is used as a substitute for white lead.

OITICICA OIL

Three forms are available on the market. 1. The crude oil is a white or cream colored semi-liquid. 2. The semi-polymerized oil is amber colored, a viscous fluid. 3. The third type is obtained when the semi-polymerized oil is mixed with a type of mineral spirits. It is a clear light oil.

Properties:

	1.	2.
Specific gravity	0.965	0.975
Acid value	5.0	7.5
Saponification value	185	
Refractive index	1.514	1.507 (25°C.)

OLEIC ACID

OLIVE OIL

Uses:

Substitute for tung oil. Drying oil in paints.

Substitute:

Cicoil.

OLEIC ACID

See Red Oil.

OLEOMARGARINE

A mixture of natural or hydrogenated vegetable or animal fats. This mixture is colored and occasionally flavored with butter.

It has been used as a substitute for butter.

OLEUM PALMAL

See Palm Oil.

OLIVE OIL (Sweet Oil, Florence Oil, Luccu Oil)

A fixed liquid oil pale yellow or greenish yellow in color. It is usually obtained by expressing the fruit of the olive tree.

Properties:

Specific gravity0.910-0.918

Saponification value188-196

Iodine value77-88

Solubility:

Soluble in chloroform, ether, carbon bisulfide.

Slightly soluble in alcohol.

Uses:

Food, ointments, soaps, lubricants, tanning, etc.

In Italy it is used as a substitute for butter.

Substitutes:

Herring oil from which the taste has been removed.

Sesame oil.

Peanut oil, cottonseed oil, corn oil, refined rice oil have been found to be useful substitutes for olive oil when it is used as an edible oil.

Peanut oil has also been suggested as a substitute for olive oil as a soapstock. It may be used instead of sulfonated olive oil. Grapeseed oil also replaces olive oil as a soapstock.

In wool processing a mixture of fairly heavy mineral oil and cocoanut oil seems to be a promising substitute for olive oil.

Glaurin, diglycol laurate and cabbage-seed oil have been reported to be substitutes for olive oil in various technical applications. ,

Nopco C.P. may also serve as a substitute for olive oil in wool and worsted processing.

OLIVER'S BARK (Black Sassafras)

The dried bark of Cinnamon oliveri which occurs in Queensland.

It is used, in Australia, as a substitute for cinnamon.

OLIVINE (Crysolite) $(\text{MgFe})_2\text{SiO}_4$

A silicate of iron and magnesium. It is usually greenish in color.

Properties:

Specific gravity3.26-3.44

Hardness6.5-7

Index of refraction1.67

Uses:

Potential source of magnesium because of the fact that its magnesium content ranges from 27-30%.

ONCO "V"

Trade name for a cellulose product which is claimed to be a tough, durable, flexible fabric.

Uses:

As a substitute for latex in cellulose insoles in the manufacture of shoes. Experiments are being carried out by manufacturers of luggage, linoleum, handbags, gaskets, etc., to see if this product can fill the shortages caused by war time scarcities.

OPALWAX

Trade name for a synthetic wax. There are several grades all of which are claimed to be grease-resistant and to have excellent penetration powers.

Uses:

In the manufacture of candles, shoe polish, carbon paper, paper-impregnation, wood-impregnation, cloth-impregnation, electrical condenser impregnation.

OPAX

Trade name for a white material which consists of the following substances:

ZrO_2 87.4%

SiO_2 7.75%

Na_2O 1.3%

Al_2O_3 1.5%

Its specific gravity is 5.22.

Uses:

Opacifier for glasses, glazes and enamels. Similar to Ambrox.

ORTHENE

See Dichlorobenzene, Ortho.

ORTHOCRESOL

See Cresol, Ortho.

ORTHO-CRESYLIC ACID

ORTHO-CRESYLIC ACID

See Cresol, Ortho.

ORTHODICHLOROBENZENE

See Dichlorobenzene, ortho.

ORTHO-KRESOL

See Cresol, Ortho.

ORTHO-METHYLPHENOL

See Cresol, Ortho.

ORTHO-OXYTOLUENE

See Cresol, Ortho.

OTTO OF ROSE OIL

See Rose Oil.

OXALIC ACID $\text{COOHCOOH} \cdot 2\text{H}_2\text{O}$

Poisonous crystals which are transparent and colorless.

Specific gravity1.653

Melting point187°C

Solubility:

Soluble in water, alcohol, ether.

OXYTRIBALLYLIC ACID

Uses:

Celluloid manufacture, rayon, leather, textiles, etc.

Substitutes:

It has recently been reported that this vital chemical may be obtained from sawdust by an inexpensive process. It is claimed that 100 pounds of sawdust (dry) will yield 50 pounds of oxalic acid, 14 pounds of acetic acid and 4 pounds each of formic acid and wood alcohol. Under normal circumstances these chemicals would sell for about \$8.

OXYCYMOL

See Carvacrol.

OXYACETIC ACID

See Glycolic Acid.

OXYMETHYLENE

See Formaldehyde.

OXYPHENYLBENZYLKETONE

See Benzoin.

OXYTRIBALLYLIC ACID

See Citric Acid.

OZOKERITE (Fossil Wax, Native Paraffin)

A mixture of hydrocarbons found in nature. It is wax-like in nature, yellow-brown to black or green in color. When pure it is translucent and it possesses a greasy feel.

Properties:

Specific gravity0.85-0.95
Melting point55-110°C.

Solubility:

Soluble in benzene, turpentine, kerosene, ether, carbon bisulfide.
Slightly soluble in alcohol.
Insoluble in water.

Uses:

Substitute for carnauba and beeswax, ceresin, electrotyper's wax.

Substitutes:

Ozowax.
Ceraflux.

OZOWAX

Trade name for a light brown wax which possesses a good lustre. It blends with carnauba wax, beeswax, rosin, ozokerite, paraffin wax.

Properties:

Specific gravity0.893 (80°C.)
Melting point.....76-85°C.
Saponification value39
Acid number12

Solubility:

Soluble (hot) in toluene, mineral spirits, turpentine, naphtha, mineral oil, vegetable oil.

Uses:

Substitute for ozokerite.

P

PAINT SUBSTITUTES

A low-oil or completely oil-free paint is produced in Germany. This is done with the aid of synthetic polymerizers and concentrators, cellulose derivatives and chlorinated rubbers. They also obtain excellent lacquers using synthetic resins and gums.

The Germans also preserve oil in paint formulas by combining natural oils with a synthetic product. Blown or sulfonated oils are used to obtain good paints. Usable products are obtained by the utilization of slow-drying oils such as tall oil ester, whale oil, soy bean oils and synthetic drying oils. These oils are used, in addition, for the prevention of rust.

Quick-drying oils are obtained from slow-drying oils by means of high-pressure blowing methods at varying temperatures. Good outdoor paints are being made from alkyd and phenol resins in conjunction with synthetic softeners and with the addition of vinyl or acryl resins and chlorinated rubbers.

PALM BUTTER

See Palm Oil.

PALM GREASE

See Palm Oil.

PALM-KERNAL OIL

See Palm-Nut Oil.

PALM OIL (Palm Butter, Palm Grease, Oleum Palmal)

A reddish-yellow fatty mass with the consistency of butter. It possesses a faint odor of violets. It is obtained from the putrefied or fermented pulp of the fruit of the palm, *Elaeis guineensis* by extraction or expression.

Properties:

Specific gravity0.920-0.927

Melting point27-42.5°C.

Saponification value202

Iodine value51.5

Acid number24-200

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

As a substitute for coconut oil as a soap-stock.

It is also used in the finishing of tin-plate, coating iron plates, in lubricants and in the coloring of butter substitutes.

PALMALENE

Substitutes:

Palmene has been found to be an excellent substitute in many technical processes.

In the finishing of tinplate hydrogenated cottonseed oil may be used.

As a soapstock babassu oil, cohune oil or coyol oil may be utilized.

PALMALENE

A new synthetic palm fatty acid of medium titre.

Properties:

Saponification value180-185

Iodine value55-60

Titre35

Uses:

Soapstock, textiles, alkyd resins, polishes, wetting agent, cosmetics, rubber compounding, etc.

PAO SANTO

The bark of the Angica Reyada tree. It grows in Brazil. It possesses all the characteristics of cork but to a lesser degree.

In Brazil this bark is used for many of the purposes for which cork is used.

PARA-ACETALDEHYDE

PAPAIN (Papayotin, Vegetable Pepsin)

An enzyme which is similar to pepsin. It is obtained from the juice of the fruit and leaves of *Carica papaya*. This juice is concentrated and the active principle extracted.

It is used as a proteolytic enzyme.

Substitutes:

Keralin F.

PAPAYOTIN

See Papain.

PAPER

Parachutes made of para-crepe paper have been tested. It is claimed that twenty-five pounds of supplies may be dropped by this means.

Kraft paper has been used to construct a life boat. Twenty-five layers were treated with waterproof glue. The frame work is of cedar and the skin is made of this kraft paper.

PAPER PULP

See Activated Carbon.

PARA-ACETALDEHYDE

See Paraldehyde.

PARAFFIN

PARLON

PARAFFIN

Waxy, tasteless, translucent solid. It consists of a mixture of solid hydrocarbons.

Properties:

Specific gravity0.880-0.915

Melting point42-60°C.

Solubility:

Soluble in benzine, benzene, warm alcohol, chloroform, turpentine, carbon bisulfide, olive oil.

Insoluble in water.

Uses:

As an ingredient of adhesives, in brewing, as an absorbent, as a general coating agent, as a general insulating agent, in explosives, in candles, in inks.

Substitute for batching oil in rope making.

Substitutes:

Naphthalene.

PARAFFIN OIL

See Petrolatum, Liquid.

PARALDEHYDE (Para-Acetaldehyde) $C_6H_{12}O_3$

A colorless liquid with a pleasant odor. It is not as inflammable as acetaldehyde, nor is it as reactive.

Properties:

Specific gravity0.996 (20°C.)

Boiling point124.5°C.

Melting point12.6°C.

Refractive index..1.40-1.42 (20°C.)

Specific heat0.434

Solubility:

Soluble in water.

Miscible with most organic solvents and volatile oils.

Uses:

Substitute for acetaldehyde.

PARA-PHENETOLUCARBAMIDE

See Dulcin.

PARIS WHITE

See Whiting.

PARLON

Trade name for a chlorinated rubber. It is a white powder, granular in structure, which is odorless, tasteless, resistant to acids, alkalies, and alcohols.

Properties:

Specific gravity1.64

Refractive index1.554

PEACH KERNEL OIL

Solubility:

Soluble in benzene, toluene, xylene, carbon tetrachloride, ethylene dichloride.

Uses:

Since it has excellent electrical characteristics and its water absorption is low it may be used in protective coatings, adhesives, plastics, printing inks, textile finishes.

PEACH KERNEL OIL

A yellowish to reddish liquid which is similar to almond oil in both taste and odor. It is obtained from the seeds of the peach plant.

Properties:

Specific gravity0.915

Iodine value93-109

Saponification value191

Solubility:

Soluble in ether, chloroform, carbon bisulfide.

It is only partly soluble in alcohol.

Uses:

Substitute for almond oil as a nutrient.
It is also used in medicine.

PEARL ALUM

PEANUT OIL (Arachic Oil, Earth-nut Oil, Ground-nut Oil, Katchung Oil)

A non-drying oil, yellow to greenish yellow in color, with a nutty odor.

Properties:

Specific gravity0.917-0.926

Saponification value186-194

Iodine number88-98

Solidifying point3°C.

Solubility:

Soluble in ether, benzene, chloroform, carbon bisulfide, carbon tetrachloride.

Insoluble in alkalies and water.

Saponified by alkali hydroxides to form soaps.

Uses:

Substitute for olive oil as an edible oil and as a soapstock.

It may also be used instead of sulfonated olive oil.

In the British textile industry it has been found that peanut oil may satisfactorily replace castor oil.

Substitutes:

Soy-bean oil.

PEARL ALUM

See Aluminum Sulfate.

PEARL ESSENCE

PEARL ESSENCE

A product obtained from the scales of fish. It is highly lustrous and it may be silvery in color.

Uses:

In the manufacture of artificial pearls.

In the manufacture of paints as a substitute for aluminum powder.

PEARL WHITE

See Bismuth Oxychloride.

PECAN SHELLS

It has been suggested that pecan shells can be used as a source of tannic acid in place of nutgalls. It is also claimed that these shells yield a highly absorptive charcoal upon proper treatment.

PE-CE-FIBRE

Trade name for a synthetic fiber produced in Germany. Its base is said to be polyvinyl chloride. It is thermoplastic and shrinks when heated above 80°C.

This fiber is claimed to be absolutely acid-proof and water-proof.

Uses:

It is suited for nets and ropes in the fishing industry.

PENCHLOR CEMENT

It makes good filter material in chemical industry.

Because it hardens to an incombustible mass when subjected to high temperatures it may be used for fire-proofing.

It is claimed by the manufacturer that it possesses high electrical and heat insulating power.

PECTINS

A group of substances of high molecular weight found in plants and fruits. They are related to the carbohydrates. Little is known about their structure.

Properties:

They jell under the proper conditions.

Solubility:

Soluble in water.

Uses:

Substitute for quince seed in lotions and hair dressings.

PENCHLOR CEMENT

Trade name for an acid-proof cement. This material is a self-hardening sodium silicate bonding material which is not attacked by any acid except hydrofluoric acid.

Uses:

As a substitute for litharge in the patching of acid tower linings.

PENCIL STONE

PERBUNAN

PENCIL STONE

See Pyrophyllite.

Properties:

Melting point113-115°C.

Acid number15

PENTAERYTHRITOL $C(CH_2OH)_4$

A white crystalline powder. It is not decomposed when boiled with dilute caustic. It is esterified by acids such as acetic acid.

Properties:

Specific gravity1.35

Boiling point276°C. (30mm.)

Melting point262°C.

Refractive index 1.54-1.56 (20°C.)

Uses:

Since it produces rapid drying without the use of tung oil it may be used for the preparation of fast-drying, hard, alkali-resistant varnishes.

PENTANOL

See Fusel Oil.

Solubility:

Soluble in water.

Slightly soluble in alcohol.

Insoluble in benzene, carbon tetrachloride, ether, petroleum ether.

Uses:

When reacted with dicarboxyethers or thioethers or their anhydrides the resulting resins may be used as substitutes for glass, horn or shellac.

Substitute for glycerin as a processing material in the manufacture of ester gums.

PEPSIN

A proteolytic enzyme which is a white or yellowish-white powder.

Three varieties are available to industry:

1. Insoluble in water.
2. Soluble in water.
3. Partly soluble in water or dilute hydrochloric acid.

Uses:

Substitute for rennet in cheese making.

PENTALYN

Trade name for a new resin which is hard and heat stable. It is a pentaerythrityl-abietate resin.

PERBUNAN

Trade name for a synthetic rubber which is a copolymer of butadiene and acrylonitrile. It is also called Buna N.

On treatment with sulfur it may be vulcanized just as natural rubber is and it can be made to yield compounds of varying hardness ranging from soft inking-roll stock to very hard ebonite. When carbon black is incorporated in the vulcanizate it is claimed that compounds of high tensile strength and superior abrasion resistance are obtained. This rubber possesses high elasticity and good resistance to prolonged stress. Its heat conductivity is about 20% higher than that of natural rubber.

The aging properties of Perbunan are excellent and its fatigue resistance is good. With the proper compounding it may be used at temperatures up to 300°F. and it will remain flexible at temperatures as low as -45°C. This product is unaffected by water, dilute acids or alkalis, or salt solutions of any concentration. It swells slightly in aliphatic hydrocarbons and in vegetable and animal oils and fats. The crude Perbunan is soluble in aromatic hydrocarbons but the cured compounds swell to a much lesser extent than cured natural rubber compounds. It is said to be superior to natural rubber for mixtures of gasoline with aromatic hydrocarbons. Chlorinated hydrocarbons and organic bases have a strong swelling action on it. Ketones, organic acids, alcohols and esters exert a greater swelling effect than they do upon natural rubber.

Uses:

Press roll covering material for paper machines; in the handling of petroleum products; tank lining material; printers' rolls; motor mountings; conveyor belts; gasoline hose; packing; gaskets; tires for industrial trucks; clothing; gloves.

In Germany it is used to replace leather rollers in the textile industry. It is also used for shoe soles.

PERBUNAN EXTRA

Trade name for a synthetic rubber similar to Perbunan except that it is claimed to be more oil resistant. It is a copolymer of butadiene and acrylonitrile in which a larger amount of the acrylonitrile is used.

PERCHLOROETHANE

See Carbon Trichloride.

PERCHLOROMETHANE

See Carbon Tetrachloride.

PERIDOT

See Olivine.

PERILLA OIL

A light yellow oil.

Properties:

Specific gravity	0.932-0.945
Saponification value	191-193
Iodine value	187-202
Refractive index	1.4841

Solubility:

Soluble in alcohol, ether, chloroform, benzene, carbon bisulfide.

PERLITE

Uses:

It may be used as a substitute for linseed oil.

PERLITE

A volcanic glass which may be used as a substitute for cork.

PERMANENT WHITE

See Blanc Fixe.

PERSIAN INSECT FLOWERS

See Pyrethrum.

PERU BALSAM (Indian Balsam, China Oil, Black Balsam)

A dark liquid with a molasses like consistency. It possess a pleasant odor and a bitter taste. It is obtained from the *Toluifera pereirae* of Central America.

Properties:

Specific gravity1.140-1.150

Solubility:

Soluble in alcohol, ether, chloroform and glacial acetic acid.

PETREX RESINS

Uses:

As a fixative in perfumes it may be used instead of benzoin.

PETREX

Trade name for a polybasic acid which is synthesized from terpenes.

Properties:

Acid number530 (approx.)

Softening point40-50°C.

Solubility:

Soluble in alcohol.

Uses:

In the manufacture of alkyd resins.

As a partial substitute for shellac and tannic acid in the manufacture of aniline inks.

PETREX RESINS

Trade name for a series of alkyd resins obtained from Petrex Acid. These resins are of the modified and unmodified types.

Uses:

In the manufacture of lacquers, varnishes, inks, adhesives, etc.

PETROLATUM, LIQUID

PETROLATUM, LIQUID (Liquid Paraffin, Albolene, White Mineral Oil, Glycolin, Paraffin Oil)

Colorless, oily liquid.

Properties:

Specific gravity0.840-0.940

Solubility:

Soluble in ether, chloroform, carbon bisulfide, benzene, boiling alcohol, fixed or volatile oils.

Insoluble in water.

Uses:

As a substitute for cedarwood oil as an immersion medium in microscopy.

PETROLEUM SOAP

New petroleum soaps made of superior detergents obtained from petroleum. It is claimed that these soaps will wash as well in cold as in hot water, in acid or alkaline solutions. They do better in hard than in distilled water. They are odorless and tasteless so that they may even be used to clean foodstuffs.

These new soaps may be used to replace cocoanut oil soaps and the like.

PHENIC ACID

See Phenol.

PHENYLBENZOYL CARBINOL

PHENOL (Carbolic Acid, Phenic Acid, Phenylic Acid, Phenyl Hydrate, Hydroxybenzene) C_6H_5OH

White crystals. It is poisonous. It possesses a characteristic odor.

Properties:

Specific gravity1.0677

Melting point42.5-43°C.

Boiling point182.6°C.

Solubility:

Soluble in water, alcohol, ether, chloroform, glycerol, alkalies.

Uses:

Preservative.

Selective solvent in petroleum refining.

Substitutes:

Formaldehyde may replace phenol as a preservative.

Furfural may replace phenol as a selective solvent.

PHENYLAMINE

See Aniline.

PHENYLBENZOYL CARBINOL

See Benzoin.

PHENYLDIETHANOLAMINE $C_6H_5N(C_2H_4OH)_2$

A white solid.

Properties:

Melting point58°C.

Boiling point190°C.

Solubility:

Completely dissolved by hot water.

Uses:

Substitute for dimethylaniline in the preparation of dyes.

PHENYLETHYL ALCOHOL (Benzyl Carbinol) $C_6H_5C_2H_4OH$

A colorless liquid with a rose-like odor.

Properties:

Specific gravity.....1.0235

Melting point-27°C.

Boiling point219°C.

Solubility:

Soluble in alcohol and ether.

Slightly soluble in water.

Uses:

Synthetic rose oil.

PHENYLFORMIC ACID

See Benzoic Acid.

PHENYL HYDRATE

See Phenol.

PHENYL HYDRIDE

See Benzene.

PHENYLIC ACID

See Phenol.

PHENYLMETHANE

See Toluene.

PHENYLMETHANIC ACID

See Benzoic Acid.

PHLOGOPITE

See Mica.

PHORONE $(CH_3)_2CCHCOCH_3$

A yellow liquid.

PHOSPHORIC ACID

PINENE III

Properties:

Specific gravity	0.8791
Boiling point	197.9°C.
Freezing point.....	20°C.
Flash point	185°F.

Uses:

Nitrocellulose solvent. It resembles camphor in many of its properties.

PHOSPHORIC ACID H_3PO_4

A colorless syrupy liquid.

Properties:

Specific gravity	1.834
Melting point	38.6°C.

Solubility:

Soluble in water.

Uses:

As a substitute for citric acid in food and drink products.

Substitute for tartaric acid in the manufacture of jellies, essences and soft drinks.

PICKLE ALUM

See Aluminum Sulfate.

PINE OIL

A term which covers a Naval Stores product consisting of a variety of oils. These usually consist of terpene alcohols, ketones and ethers. They also contain small quantities of high boiling terpene hydrocarbons.

Uses:

As a solvent in various industries.

Emulsifying agent.

Fungicide.

In the manufacture of coated paper.

Metal polishes.

When acetylated, pine oil may serve as a substitute for pyrethrum as an insecticide.

Substitutes:

Dimethyltolylcarbinol.

Sulfonated tall oil may substitute for pine oil in the manufacture of coated paper.

PINENE III

Trade name for a grade of dextro alpha pinene which contains approximately 96% of pinene. It is said to be free from high boiling ends, it possesses a pleasant odor and is water-white in color.

Properties:

Specific gravity	0.8632 (15.5°C.)
Refractive index	1.4665 (20°C.)
Flash point	32.5°C.
Aniline point	26.2°C.

Uses:

It may be used interchangeable with turpentine. It may be preferred where its greater volatility will be of use.

PLASTACELE

Trade name for a thermoplastic cellulose acetate plastic. It is available in the form of sheets, rods, tubes and powders both for compression and injection molding. It is transparent, translucent and is available in colors.

This plastic is claimed to possess mechanical strength, to be slow-burning, to be a low conductor of heat and to be unaffected by most vegetables and mineral oils. Its specific gravity is 1.31-1.36.

Plastacele is only slightly affected by weak acids and alkalis. It is decomposed by strong acids and alkalis. It is soluble in esters and ketones, softened by alcohols and only slightly affected by hydrocarbons.

Uses:

Adding machine keys, bracelets, buckles, airplane cowlings and windshields, buttons, bobbins and spools, bottle caps, cigarette cases, commutator parts, combs, containers, door knobs, musical instruments, light switches, protective goggles, etc.

PLASTIC CALK

Trade name for a plastic compound which may be used to cement glass to glass, metal or wood. It may also be used

for calking crevices, making joints of various kinds, etc.

It is a substitute for putty.

PLASTIC POLARIZING FILM

A trade named product manufactured wholly from available raw materials produced entirely in the United States. It is claimed to be available as a plastic film or as laminated glass.

It does away entirely with the need for quinine and cinchonidine.

This product is used in gunsights, range finders, binoculars, telescopes, navigational instruments, scientific instruments, non-glare goggles and eye glasses, etc.

PLASTIC TUBING

See Saran.

PLASTICS

It is difficult to define plastics but broadly speaking they may be looked upon as materials which under the influence of pressure and heat become soft enough to form, shape or press into any desired shape and when cooled retain the form imparted to them. There are two types of plastics, thermoplastic and thermosetting.

The thermoplastic material softens when heated. On cooling it becomes rigid. If it is reheated it softens again. This process may be repeated again and again.

PLASTICS

Examples of thermo-plastic materials are vinylite, cellulose esters, methyl methacrylate and polystyrene.

Thermosetting resins undergo a chemical change under the effect of heat and pressure. They set permanently to a solid, infusible mass. The phenol-formaldehyde and urea-formaldehyde plastics are examples of thermo-setting plastics.

Organic plastics may be classified into four main groups:

1. Cellulose derivatives.
2. Synthetic resin plastics.
3. Natural resins.
4. Protein resins.

The history of the plastic industry begins in 1868 when celluloid, the first plastic material, was introduced as a substitute for ivory in billiard balls. Since that time such great progress has been made that we may be said to be entering the "Plastic Age". It was not until 1909 however, when Dr. Baekeland published the results of his researches on phenolic resins that the industry really began to make real progress. Today the chemical literature is so full of newly discovered plastics and uses that the materials number in the thousands.

CELLULOSE DERIVATIVES. Celluloid or nitro-cellulose was first introduced in 1868 as a substitute for ivory in billiard balls. The base material is cotton linters treated with nitric acid. Camphor is used as a plasticizing material. Since nitrated cellulose or pyroxylin is explosive it was found that the explodability of the product was reduced by the addition of the camphor. Other substances have been used instead of camphor as plasticizing materials. Examples are tricresyl phosphate, a liquid, and triphenyl phosphate, a solid.

The great inflammability of these nitrated cellulose products led to the development of other cellulose derivatives, cellulose acetate being the most important one. Here again cotton linters are used. However, instead of nitrating with nitric acid, acetic acid and acetic anhydride are used.

Photographic safety films are made from cellulose acetate. They are not inflammable.

SYNTHETIC RESIN PLASTICS.

This group includes the phenol-formaldehyde resins, the amino resins, (urea-formaldehyde) the alkyd, methyl methacrylate resins, polystyrene, polyvinyl acetate, alcohols, etc.

The greatest advances have been made in this group and more applications have been found for these than for any of the others.

The phenol-formaldehyde plastics really obtained their start with the discovery by Dr. Baekeland of the condensation of phenols with formaldehyde to form a resin. The resulting products, Bakelite, were infusible, insoluble, solid plastics. They possessed high strength, moldability and durability and their uses rapidly increased. The electrical industry found them of great use as insulators. The automobile industry also became interested and with these as a start they rapidly became very popular for a great many applications.

The urea-formaldehyde resins in their final state are clear, colorless and as transparent as glass. They possess a wide variety of color selection. They are essentially unbreakable. These resins find their chief use in toilet articles, scale parts, drinking cups and products of a like nature.

Vinyl resins have risen in importance during the past decade. The important

PLASTICS

raw materials are vinyl acetate and vinyl chloride. On polymerization and subsequent condensation a group of important synthetic materials is obtained. These products are available in the form of sheets, tubes, rods and molding powders. They are used for the manufacture of phonograph records, plastic novelties, dentures and wall panels. Such rubber substitutes as Koroseal, Flamenol and Saran are vinyl resins. When extruded polyvinyl resins may be used in the manufacture of synthetic fibers and woven furniture. In the field of safety glass and insulation for electrical wires polyvinyl acetals are gaining a position.

The acrylic resins are similar in molecular structure to the vinyl resins. These resins are sold under the name of Plexiglass and Lucite. They are clear, colorless, transparent, practically unbreakable and non-inflammable. They are used mainly in the manufacture of the hoods protecting the cockpits in airplanes.

Polystyrene resins are comparatively new in the field of plastics. The resins produced from this material are useful as insulating media for high-frequency radio equipment. They are available in the form of films, threads or molding powders.

The alkyd resins when incorporated in synthetic surface coatings impart many desirable qualities. Although they are not primarily molding materials they may be used as binders for mica-splits and flakes forming sheets of excellent insulating materials. These resins also find use in gaskets, laminated fabrics and paper.

Protein plastics utilize casein as the raw material. The plastic is prepared by powdering the casein and mixing it with a coloring matter or a filler. It is then formed into a dough by the addition of hot water and finally passed between heated rolls to form sheets. The button

industry is the main consumer of casein plastics.

As may be seen from the foregoing discussion plastics find a multitude of uses under a great many trade names. Extensive applications have been found in the electrical industry, in the mechanical field, in engineering analysis, in the chemical processing industries, in the decorative arts, and in the metal industry.

It should be emphasized at this point that plastics are not substitute materials. They are entirely new materials which have supplanted many other substances because of their superior properties. The use of plastics has been found to improve the final product over what it was before. In addition many new products formerly unobtainable are now being made with plastics.

Plastic materials may be looked upon as strategic materials. They find use in practically every war machine and department as well as in primary industrial applications. Because of their light weight, insulating properties and resistance to temperature changes they are being used in a greater number of cases where metals were formerly utilized.

Melamine resins are the newest member of this group. They are being used in the manufacture of buttons and in a new process for the treatment of paper which imparts a great strength to it. After treatment with these melamine resins the paper may be used for sandbags, tents, food containers and clothing.

Certain types of plastics may be used in the waterproofing of fabrics. This is of great assistance to the nation in the conservation of rubber for raincoats, etc.

Cooling baffles and pushrod housings for certain types of airplane engines are now being made of plastics. In this man-

ner great quantities of aluminum are being conserved. In addition the weight of the engines are reduced.

A plastic covered metal conduit has been developed for use in airplanes, tanks and boats. Where formerly rubber was used now this plastic is conserving this vital material. The new product is called Amerflex. Here again the weight reduction is an important factor.

In the manufacture of adhesives for plywood plastics have played an important role. It has been found that thin sheets of plywood, bound together with a plastic are resistant to water. The bound plywood is stronger than the original.

It may be said that plastics have finally come of age. They have changed from the status of ersatz to that of new materials, replacing and not substituting for natural materials.

One of the great important features of plastics is that they can be made to fit any specification. Because of this feature they should supersede most natural materials over whose formation man has no control. It is difficult to visualize the limits of their uses.

PLASTIPITCH

Trade name for a process of making coatings which are weather, atmosphere and corrosion resisting. It is claimed that these coatings resist all alkalies and acids normally found in the atmosphere. It is permanently bonded to the metal and it is unaffected by steam, salt or water and smoke.

It may be used to replace galvanizing and rolled methods of bituminous application.

PLASTOLS

Trade name for a series of products which resemble camphor and which may be used in place of camphor for cetrain purposes. They are white and solid. These products impart solidity and elasticity to cellulose esters just as does camphor. They are resistant to light. Plastols are soluble in alcohol and in most of the ordinary solvents.

PLATELUSTRE

Trade name for a series of products which are said to be concentrated lacquer and synthetic base enamels. These are to be added to clear lacquer or clear baking synthetic lacquer to give a brilliant, transparent, colored effect on polished metals. These products are claimed to be fast to light under the usual indoor conditions but are not recommended for outdoor use.

PLATINUM Pt

A ductile metal which is silvery white and which does not tarnish at any temperature. It is harder than silver or gold.

Properties:

Specific gravity21.45

Melting point1773.5°C.

Solubility:

Soluble in aqua regia.

Insoluble in mineral and organic acids.

Attacked by fused alkalies.

PLEXIGLAS

Uses:

Catalyst.
Laboratory ware of all kinds.
Electrodes, wires, etc.
Industrial equipment.
Jewelry, dentistry, electrical contacts,
etc.

Substitutes:

Magnesium oxide.
Molybdenum is a substitute for platinum
in contact-making and breaking devices.

PLEXIGLAS

Trade name for an acrylic plastic which is colorless, perfectly transparent, and thermoplastic. It is available in the form of sheets and rods in a number of colors, both transparent and translucent. It is claimed that it can be readily machined and that it is lighter in weight than glass. It is practically unbreakable and more transparent than optical glass.

This product is unaffected by water, all concentrations of hydrochloric acid, salt solutions, mineral oil and animal oils, 50% sodium hydroxide and 50% sulfuric acid do not attack it at room temperature. It is insoluble in hydrocarbons, ethers, amines, alkyl monahalides, esters with more than ten carbon atoms, and formamide.

It is soluble in ketones, lower esters, aromatic hydrocarbons, acetals, chloroform, ethylene dichloride, propylene dichloride.

Properties:

Specific gravity1.18-1.19
Refractive index1.488-1.489
Tensile strength
7000-8000 lbs. per sq. in.

Uses:

It may safely be used in electrical applications because it serves as a good insulator.

It has a high impact strength. Although it is not literally unbreakable when it does break it does so with large dull-edged pieces and may thus be used in public buildings and displays where glass would be a hazard.

When heated to 220-300°F. it softens and can be bent to any shape. It may be used in medical instruments which conduct light but not the heat of the light.

In airplanes it may be used for windshields and other transparent sections.

In industry it is used to construct transparent models for exhibitions.

Jewelry, table ware, safety goggles, ultraviolet windows, lenses are all constructed from Plexiglas.

PLEXIGUM

Trade name for a solution of acrylic resins in ethylene dichloride. It is viscous, colorless, weather-resistant and it possesses excellent adhesive properties.

Properties:

Light transmission92%
Index of refraction1.48

PLIOFILM

Solubility:

Soluble in ketones, lower esters, aromatic hydrocarbons, phenols, aryl halides, aliphatic acids, acetals, chloroform.

Insoluble in paraffin and olefin hydrocarbons, ethers, amines, alkyl monohalides, esters with more than ten carbon atoms, formamide.

Not affected by water, all concentrations of hydrochloric acid, salt solutions, mineral oil and animal oils. 50% sodium hydroxide and 50% sulfuric acid at room temperature have no action on it.

Uses:

Because the film formed by it is very flexible it may be used as the laminating layer in safety glass. This flexibility reduces the force of the blow.

PLIOFILM

Trade name for a rubber hydrochloride. It is sold in the form of sheets or rolls. It is claimed to be resistant to moisture, water, oils, greases and most common solvents. It is also claimed to be very heat stable and flexible.

An emulsified product has been developed which can maintain its exact size under all conditions of wetting and handling. Known as Transphoto film it is used in the airplane industry for the fabrication of templates. This is said to be superior in accuracy to anything used before. The process may be adapted also to produce duplicating layouts on masonite, plywood, and other non-metallic surfaces provided the material is first coated with a special zinc-base paint.

PLUMO-PLUMBIC OXIDE

PLIOLITH

Trade name for a rubber condensation derivative. It is amber colored, tasteless, odorless, nontoxic. It is claimed that its dielectric properties are good. It is obtained when rubber is polymerized in the presence of the proper catalysts. It is thermoplastic.

Properties:

Specific gravity1.05

Solubility:

Soluble in petroleum thinners and coal tar solvents.

Resistant to alkalies, acids, salt solutions.

Compatible with most of the common waxes.

Uses:

Corrosion-resistant paints, concrete enamels, wall finishes, packages, moisture-vapor-proof kraft and glassine, grease-proof coatings, decorative items, football helmets, polo helmets, etc.

PLUMBAGO

See Graphite.

PLUMO-PLUMBIC OXIDE

See Lead Oxide, Red.

PLUMBUS OXIDE

POLAR K

PLUMBUS OXIDE

See Litharge.

PLYFORM

Trade name for a type of plywood of special construction. It is made for concrete form work. It is claimed that it may be used from 6-12 times. It is preferred to solid lumber for form work because it leaves a smoother concrete surface and requires a minimum amount of rubbing and finishing.

PLYMETAL

A special type of plywood with one or more outer or inner layers of sheet metal. The use of inner metal layers provides a fire-resistant back-ground for attractive wood and veneer effects.

This product may be used for elevator cabs and enclosures.

PLYWOOD

Plywood is bonded today by means of resin adhesives which are prepared from condensation products of phenol and formaldehyde. The adhesive is spread over the surfaces and allowed to evaporate for a short time. The plies are then pressed together and the resin is cured. A solid and permanent bond is thus secured.

Although this product is more expensive than the glue-bonded plywood its mechanical properties are excellent. The

plywood thus formed can be bent and formed to almost any shape.

Uses:

Airplane construction. A structural advantage of high strength-weight ratio is obtained in this manner. Production is also speeded up.

Boat hulls are also constructed of resin bonded plywood.

Interior decorations.

Skis.

Many places where wood alone formerly was used.

Propeller construction, instrument boards, floors in airplanes, chairs, seats, tables, partitions, berths, patterns for metal sheets, barrels, trunks, etc.

FOGY OIL

See Menhaden Oil.

POLANA

Trade name for a casein synthetic fiber manufactured in Poland.

POLAR K

Trade name for an oil which is claimed to be superior to alcohol for dehydrating and cleaning steel surfaces, bearings and similar parts which have become wet or have been left with a film of grinding emulsion.

POLAROID

It is said that this product instantly displaces and absorbs water and leaves a thin film of lubricant and rust preventative. It is completely soluble in hydrocarbon and lubricating oils.

POLAROID

Trade name for a type of glass which consists of two ordinary glass sheets interposed with a layer of a special cellulose acetate fiber. This fiber contains crystals of alkyoidal iodide crystals. Light is polarized in this manner.

Uses:

Eliminates glare in headlight lenses and sun-glasses.

Polaroid goggles, which are used by night fliers to get used to the dark, have recently been perfected.

POLISHING OIL

Sometimes used in the petroleum industry to designate the fraction which boils at 130-160°C.

Uses:

Substitute for turpentine.

POLLAPAS

Trade name for a product which is transparent, colorless and solid. It resembles rock crystal or flint glass. This

POLYBUTENE

product is said to be made of urea and formaldehyde.

Uses:

Substitute for glass.

POLYBUTENE

Trade name for a synthetic rubber-like material which is a polymer of isobutylene. It does not vulcanize by the ordinary methods used in the curing of rubber.

Properties:

Specific gravity0.92

This product is available in various forms depending on the molecular weight. The low molecular weight polymers are soft and tacky. They are semi-liquid in appearance. The medium molecular weight polymers and the high molecular weight polymers are very rubbery materials, water-white in color. Storage does not cause deterioration. The tensile strength of the higher polymers is equal to that of unvulcanized rubber. Its electrical properties are claimed to be excellent and it is said to be resistant to the action of ozone.

Solubility:

Soluble in petroleum and coal-tar solvents.

Insoluble in alcohols, esters, ketones and most oxygenated solvents.

Resists the action of strong acids, bases and other corrosive chemicals.

POLYSTYRENE RESINS

Uses:

Low molecular weight polymers:

Used as adhesives, calking compounds, plasticizer for waxes and resins.

Medium and high molecular weight polymers:

Acid resistant tank linings, coatings, gaskets, packing, etc.

When used with natural rubber it is found to improve the heat resistance of steam hose and belt covers. It also improves the ozone resistance of wire and cable insulation. The chemical resistance of tank linings and equipment coverings is increased.

It also increases the impermeability of inner tubes, gas masks and balloon cloth. The resistance to repeated flexing is also increased by incorporation of polybutene in the compounding formula.

POLYSTYRENE RESINS

These are synthetic resins obtained by the polymerization of styrene.

The color of the resins vary from water-white to light yellow.

These resins are soluble in aromatic hydrocarbons, chlorinated hydrocarbons and esters. Their physical properties may be made to vary over a wide range depending upon the conditions under which polymerization occurs. They are thermoplastic materials and their dielectric value is high. They resist the action of water, alcohol, and most acids and bases.

It is claimed that they possess the highest insulating power of any available synthetic resin.

POLYVINYL CHLORIDE

Uses:

Hardening and adhesive promoting agents for waxes which are used as bases for varnishes and lacquers.

Examples of polystyrene resins are the following:

Resoglaz, Trolitul, Victron, Tepperite.

POLYVINYL ACETATE RESINS

These resins are colorless, odorless, tasteless and permanently thermoplastic. They are flexible, light in color, light stable, tough and hard. They are transparent to ultraviolet rays and their dielectric strength is high.

Uses:

Surface coatings, lacquers.

POLYVINYL BUTYRAL

A plastic material obtained when polyvinyl alcohol is condensed with butyraldehyde.

It is claimed that this product may be used as a rubber substitute in the manufacture of raincoats, life belts, etc.

POLYVINYL CHLORIDE

A copolymerization product of vinyl chloride. These products possess exceptional chemical resistance. They may be molded.

PORCELAIN

In Russia it has been found that solutions of polyvinyl chloride may be used as substitutes for shellac in the manufacture of phonograph records.

PORCELAIN

A recent development in the use of porcelain to replace critical metals has been the report that this material may be accurately formed to specified dimensions during or after manufacture.

Uses:

Valves, faucets, stopcocks, etc., can now be ground to excellent fit.

Porcelain rolls for various machines are available at the present time.

Hard porcelain has been successfully utilized for heat exchangers.

PORCELAIN CLAY

See Kaolin.

POTASH

Potassium hydroxide is known to the trade as potash. The term is also applied to potassium carbonate, potassium oxide.

The United States is practically independent of foreign sources for its potash supply.

In England it has been suggested by the Ministry of Agriculture that common salt can be used as a substitute for potash as a fertilizer.

POTASSIUM ACID TARTRATE

POTASSIUM ACETATE (Diuretic Salts) $KC_2H_3O_2$

A hygroscopic powder which is white and crystalline. It is obtained by the action of acetic acid on potassium carbonate.

Properties:

Melting point292°C.

Solubility:

Soluble in alcohol and water.

Insoluble in ether.

Uses:

Substitute for calcium chloride as a desiccant.

It is also used as an ingredient of the batch used in the manufacture of crystal glass.

In the paint and varnish industry it may be used in the manufacture of the pigment cobalt yellow.

In medicine it has been suggested for the treatment of rheumatic fever.

POTASSIUM ACID CARBONATE

See Potassium Bicarbonate.

POTASSIUM ACID TARTRATE

See Potassium Bitartrate.

POTASSIUM-ANTIMONY TARTRATE**POTASSIUM BITARTRATE****POTASSIUM-ANTIMONY TARTRATE**

See Antimony-Potassium Tartrate.

POTASSIUM BICARBONATE (Potassium Acid Carbonate) KHCO_3

Transparent crystals or powder which are colorless and odorless.

Properties:

Specific gravity2.17

Melting point
decomposes at 100-120°C.

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

Substitute for yeast or baking powder in baking.

POTASSIUM BICHROMATE (Potassium Dichromate, Red Potassium Chromate) $\text{K}_2\text{Cr}_2\text{O}_7$

Yellowish-red, transparent crystals, which are poisonous.

Properties:

Melting point396°C.

Boiling point
decomposes at 500°C.

Specific gravity2.692

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

Analytical chemistry, electroplating, pyrotechnics, textiles, safety matches, dyes, glues and adhesives, brass pickling, preservative, chrome tanning leather, wood stains, photography, synthetic perfumes, etc.

Substitutes:

Sodium bichromate.

POTASSIUM BITARTRATE (Cream of Tartar, Potassium Acid Tartrate) $\text{KHC}_4\text{H}_4\text{O}_6$

White Crystalline substance.

Properties:

Specific gravity1.956

Solubility:

Soluble in water.

Slightly soluble in alcohol.

Uses:

In baking powder.

It is also used in the galvanic tinning of metals.

Substitutes:

Saccharolactic Acid.

Mucic acid.

Ammonium sulfate.

POTASSIUM CHLORATE

POTASSIUM CHLORATE KClO_3

Colorless, odorless, lustrous crystals or powder. It possesses a saline taste. It is poisonous.

Properties:

Specific gravity2.337

Melting point357°C.

Boiling point
decomposes at 400°C.

Solubility:

Soluble in water and alkalis.

Slightly soluble in alcohol.

Uses:

Oxidizing agent.

In the manufacture of matches and explosives.

In the manufacture of dyes and paper.

In the printing of textile fabrics.

Substitutes:

Sodium chlorate.

POTASSIUM DICHROMATE

See Potassium Bichromate.

POTASSIUM FERRICYANIDE $\text{K}_4\text{Fe}(\text{CN})_6$

Red, lustrous crystals which are poisonous.

POTASSIUM SODIUM FERRICYANIDE

Properties:

Specific gravity1.8109

Melting pointdecomposes

Solubility:

Soluble in water.

Slightly soluble in alcohol.

Uses:

Calico printing.

Wool dyeing.

Blue print paper.

In tempering steel.

In the production of pigments.

In the leather industry and in the manufacture of paper.

In electroplating.

Substitutes:

Potassium sodium ferricyanide.

POTASSIUM MICA

See Muscovite.

POTASSIUM SODIUM FERRICYANIDE $\text{K}_2\text{NaFe}(\text{CN})_6$

Red crystals. They are non-hygroscopic and stable.

Properties:

Melting pointdecomposes

POTASSIUM STEARATE

Solubility:

Soluble in water.

Uses:

Replaces the imported potassium ferri-cyanide and thiourea.

POTASSIUM STEARATE

See Ammonium Stearate.

POTATO OIL

See Fusel Oil.

POTATO SPIRITS

See Fusel Oil.

POWDER METALLURGY

Objects are made by the heat treatment of metallic powders. This may be done with or without the use of a non-metallic substance. A single metal powder or a complex mixture may be worked by means of this method. It may be carried out at ordinary temperatures or the temperature may be elevated.

The resulting products often are identical with the products obtained by means of the regular methods. But quite frequently products are obtained which were unobtainable with the orthodox methods.

PROPANE

This process is useful in the manufacture of bearings, clutch facings and filters.

PRECIPITATED BARIUM SULFATE

See Blanc Fixe.

PRESWOOD

Trade name for a hard board product which is made by exploding wood chips under heavy steam pressure in an industrial gun. The resulting product is a fiber-mass which is pressed into grainless hardboards. These boards are dense, smooth and highly moisture-resistant.

Uses:

Trailer exteriors, tank linings, ambulance interiors, airplane die-stock, mess-tables, etc. The steel in war-style refrigerators is being replaced by this product. The same is true of filing cabinets, office equipment, furniture, etc.

Steel may also be replaced by a hardwood that can be bent to form reflectors for florescent lighting equipment.

PROPANE (Dimethylmethane, Propyl Hydride) C_3H_8

A colorless gas with a characteristic odor. It is very stable and heavier than air.

PROPENE NITRILE

Properties:

Specific heat at constant pressure
0.365

Specific heat at constant volume
0.315

Ratio of specific heats
(cp.cv)1.153

Boiling point-44.5°C.

Melting point-189.9°C.

Critical temperature95.6°C.

Critical pressure (absolute)
661 lbs./sq. in.

Uses:

As a general substitute for butane as a fuel for industrial and household purposes.

It is also used as an extraction agent for fats and oils.

In the steel industry it may be used as a substitute for acetylene.

In gas making it is used as an enrichener

PROPENE NITRILE

See Acrylonitrile.

PROPENYL ALCOHOL

See Glycerin.

PROPYL ALCOHOL

See Isopropyl Alcohol.

PROPYL HYDRIDE

See Propane.

PROPYLENE GLYCOL

A colorless, practically odorless liquid which closely resembles ethylene glycol in solvent properties and its affinity for water.

Properties:

Specific gravity1.0381 (20°C.)

Boiling point187.4°C.

Refractive index1.4293

Solubility:

Miscible with water, alcohol, and many organic solvents.

Uses:

Substitute for brine solution in various types of refrigerating machines.

PROPYLFORMIC ACID

See Butyric Acid, Normal.

PROSEIN

Trade name for a soybean derivative containing about 53.5% of protein. It is used to replace casein in water paints and other coatings.

PROTECTOID

Trade name for a product which is a solid solution of cellulose acetate and plasticizers. It is marketed in the form of transparent foils and films.

Properties:

Specific gravity1.29-1.32

Refractive index1.483-1.492

Tensile strength
5000-11000 lbs. per sq. in.

It is resistant to aging and sunlight.

Uses:

Transparent wrapping material, windows for cartons, envelopes and boxes, soda straws, paper lamination, wire insulation, etc.

PROTOFLEX

Trade name for a product which is claimed to be a protein derivative. It is a yellow paste.

Solubility:

Soluble in water.

Insoluble in mineral oil, mineral spirits, vegetable oil, toluene.

Uses:

As a substitute for gelatin it may be used in the preparation of cements and adhesives, cosmetics, various types of coatings, sizings, in photography, etc.

PRUSSIC ACID

See Hydrocyanic Acid.

PURIFIED OZOKERITE

See Ceresin.

PUTTY

A mixture consisting of chalk and linseed oil. It may also contain white lead or other pigments.

Substitutes:

Plastic calk.

PYRALIN

Trade name for a cellulose nitrate plastic. It is thermoplastic and is available in the form of sheets, rods and tubes. It can be made in practically every shade and hue, transparent, translucent, mottled, opaque and pearl effect.

Properties:

Specific gravity1.35-1.60

Refractive index1.50

Tensile strength
5000-10000 lbs. per sq. in.

Solubility:

Soluble in ketones and esters.

Softens in alcohol.

PYRETHRUM

Little affected by hydrocarbons.

Decomposes in strong acids and alkalis.

Uses:

Toilet ware, fountain pens and pencils, advertising novelties, tooth brush handles, radio dials, optical frames, umbrella handles, buttons, bathroom fixtures, shoe string tips, etc.

PYRETHRUM (Persian Insect Flowers)

Dried powder obtained from chrysanthemum flowers and Persian insect flowers.

Uses:

Insecticide.

Substitutes:

Acetylated pine oil.

Aliphatic thiocyanates.

Aromatic thiocyanates.

Benzophenone, castor oil plant, derris, Lethane 145, orthodichlorobenzene, orthodichlorodiphenyl, oxalic acid esters, parachlorodiphenyl, rotenone, serrid optone, terpinyl acetate. Thanite (thiocyanacetate of a secondary terpene alcohol).

Isobutylundecylenamide, a new organic chemical, is now available as a substitute.

Dioctylamine.

PYROFAX GAS

A trade name for a gas which is essentially propane, highly purified and refined. It is used as a general fuel in isolated laboratories.

Constants

2509 B.t.u. per cu. ft.

21,500 B.t.u. per lb.

Vapor density (air=1.0) 1.56.

Vapor pressure at 70°F. approx. 117 lbs. per sq. in.

Vol. per lb. at 15.6°C. and 760 mm. 8.56 cu. ft.

Uses:

As a domestic fuel in places not served with city gas.

Substituted for city gas.

PYROFLEX

A thermoplastic material with a depolymerized colloid resin base. It is claimed to be equal or superior to rubber in its resistance to most corrosive chemicals.

It is flexible and non-tacky over a wide range of temperature and it is said not to check or crack with severe thermal shock. Its dielectric strength is approximately equal to that of hard rubber.

It adheres to all clean metal, concrete, wood, glass and ceramic surfaces and is therefore used for tank linings which are subject to severe corrosive conditions.

PYROMUCIC ALDEHYDE

See Furfural.

PYROXYLIN

See Nitrocellulose.

PYROPHYLLITE (Pencil Stone, Agalmatolite)

A natural hydrous aluminum silicate. It resembles talc.

Uses:

Substitute for talc.

Substitute for flint in the manufacture of porcelain, pottery and enamel-ware.

PYTRAM

Cellulose fiber laminations impregnated and bonded with a special type of adhesive. It is manufactured in England.

Properties:

Tensile strength

3900 lbs. per sq. in.

Water absorption1.92%

Its freedom from corrosion and electrical conductivity are good.

Q

QUARTZ

See Silica.

QUARTZ, FUSED

Fused quartz is manufactured from pure rock crystals. In this state it is readily shaped. A temperature of about 1800°C. is required before fused quartz becomes plastic. Under these circumstances it may be shaped into any form that is produced in glass.

Some of the chief characteristics of fused quartz are:

Chemically inert; very low coefficient of expansion; constant in weight and volume; high insulation qualities; homogeneous; excellent light transmission.

Because of its valuable properties, fused quartz ware has replaced porcelain, glass, various metals, and even platinum in many instances.

QUICKLIME

See Calcium Oxide.

QUINCE SEED

See Cydonia.

QUININE

A white amorphous powder. It is an alkaloid in chemical structure. It possesses a bitter taste and is odorless. This drug is obtained from the bark of *Cinchona* and it is odorless.

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide, oils, glycerol, potassium hydroxide solution, ammonium hydroxide and acids.

It is slightly soluble in water.

Uses:

It is used mainly in the treatment of malaria.

Substitutes:

Atabrine.

R

RAISIN-SEED OIL

See Grape-seed oil.

RAOLIN

Trade name for a fully saturated chlorinated rubber. It is said to contain 65-66% chlorine both in the added and in the substituted form.

RAYOLANDA WD FIBER

A synthetic fiber manufactured in England. It is said to be of the resin-viscose type.

RAYOLANDA X FIBER

A synthetic fiber manufactured in England. It differs from Rayolanda WD in its affinity for wool dyes which is not as great. It is said to be mainly used mixed with wool in order to produce a two-toned effect.

RAYON BRISTLES

It has been reported that a secret process converts rayon into paint brush bristles. It is claimed that these bristles are as satisfactory as the bristles obtained

from the Chinese and Serbian hog, which have been cut off since the war started.

RED LEAD

See Lead Oxide, Red.

RED OIL (Oleic Acid)

Colorless crystals.

Properties:

Specific gravity0.8908

Melting point14°C.

Boiling point286°C.

Solubility:

Soluble in benzene, chloroform, ether.

Insoluble in alcohol.

Uses:

Paint driers, ointments, candles, soaps, hair oils, water-proofing textiles, etc.

Substitutes:

Tall oil.

RED POTASSIUM CHROMATE

See Potassium Bichromate.

RENNET

The enzyme which causes the separation of the curd and whey. It is obtained by extraction from the inner lining of the true stomach of the calf.

Uses:

In cheese making.

Substitutes:

Pepsin.

RENSELAERITE

See Talc.

RESILON

Trade name for a product which is claimed to be made of non-critical resins. It is said to be manufactured from resins, hydrocarbon polymers, elasticators and inert fillers.

The following is claimed for this product:

It is resistant to a wide range of acids and alkalies in various concentrations and at varying degrees of temperature. It bonds tightly to steel, concrete or wood. It does not resist strong oxidizing agents such as chromic acid, concentrated sul-

furic acid and concentrated nitric acid. It will resist all mineral acid salts except those which upon chemical reaction evolve acids as mentioned above. It will handle all normal concentrations of alkalies and caustics. It resists many organic acids. It is unaffected by water and by atmospheric oxidation. There is no chemical deterioration with age.

It is soluble in hydrocarbons and chlorinated solvents but it is insoluble in alcohols.

It is non-toxic and does not contaminate the solutions it resists.

This product is said to retain its flexibility at temperatures as low as 10°F. Its tensile strength at 70°F. is approximately 340 lbs. per sq. in. Its dielectric strength is close to that of water. Its heat conductivity is low.

It is not abrasion-resistant.

Uses:

It is used to replace rubber and synthetics in pickling tanks, plating tanks, hydrochloric acid storage tanks, electrolytic cells, electrical installations, etc.

Resilon cannot be used to handle certain organic solvents, strong oxidizing agents, oils, gasoline, benzene, carbon bisulfide, etc.

RESINOX

Trade name for a plastic of the phenol-formaldehyde group. It is thermo-setting and available in a number of colors. When compounded into various articles it is said to have high impact strength, high heat resistance and high dielectric constants.

RESINS, NATURAL

Uses:

Treads molded from this plastic are replacing rubber tires on wheeled restaurant equipment and industrial hand trucks. Although less resilient and noisier than rubber these treads roll easier over smooth or rough surfaces and it is claimed that they are easier to attach to a wheel.

RESINS, NATURAL

Various vegetable resins obtained from the secretions or saps of plants and trees. These products are hard, brittle, light in mass, and lustrous.

As a rule they are insoluble in water but soluble in organic solvents.

A recent discovery of fossil resins in Utah seems to point to a complete independence of the United States in this important material.

RESIN-IMPREGNATED PAPER

Several sheets of paper impregnated with resin and pressed together may be useful as an adhesive, particularly in laminating wood under heat and pressure. It has been found that several such sheets may replace a sheet of synthetic resin alone.

RESISTOFLEX

Trade name for a polyvinyl alcohol derivative which forms a synthetic resin. It is claimed to be resistant to gasoline, oils, and most organic solvents. It possesses a high tensile strength, is resistant

to vibration and its permeability is negligible.

Uses:

Hose and tubing.

Molded sheets and goods such as gaskets, washers, diaphragms, gloves, work aprons, printer's plates.

RESOGLAZ

Trade name for a synthetic resin of the polyester type. It is soluble in aromatic hydrocarbons and esters.

Uses:

Spirit varnish. It is not compatible with nitrocellulose.

RESORCIN

See Resorcinol.

RESORCINOL (Resorcin, Meta-dihydroxybenzene) $C_6H_4(OH)_2$

A white crystalline powder which on exposure to light turns pink if it is not absolutely pure.

Properties:

Specific gravity1.2712

Melting point110°C.

Boiling point380°C.

REZO WAX A

Solubility:

Soluble in alcohol, water, benzene, glycerol, amyl alcohol.

Uses:

In the manufacture of celluloid it may be used as a substitute for camphor.

It is also used as a reagent in chemistry and analysis, in dye manufacturing, in explosives, leather tanning, paint and varnish industry as a preservative, an ingredient of medicinal soaps, etc.

REZO WAX A

Trade name for a hard, brown wax. It possesses a high luster.

Properties:

Melting point107-112°C.

Specific gravity1.057 (25°C.)

Flash point230°C.

Solubility:

Dispersible in hot water.

Soluble (hot) in hydrocarbons.

Insoluble in cold water.

Uses:

In recording waxes.

It blends readily with other waxes, resins, etc.

REZO WAX B

Trade name for a hard, light brown wax. It possesses a dull luster.

Properties:

Melting point91-100°C.

Flash point230°C.

Solubility:

Dispersible in hot water.

Soluble (hot) in hydrocarbons.

Insoluble in cold water.

Uses:

It is similar to Rezo Wax A, but somewhat cheaper.

It replaces montan wax for some purposes.

REZYLS

Trade name for products which are obtained when a polybasic acid and polyhydric alcohol react with one another. It is a synthetic resin used primarily in baking enamels. There are a great number of these products.

RHEOLAN

Trade name for a pyrolized bitumen. It is a black solid which resembles asphalt.

RHODINOL

Properties:

Melting point307°C.

Solubility:

Insoluble in water.

Uses:

Electrical insulation, waterproofing, filling compound.

RHODINOL

Trade name for a product which is claimed to be a mixture of citronellol and geraniol.

Uses:

Substitute for rose oil in the manufacture of perfume.

RHODIUM PLATING

Jewelry items of platinum and gold have their beauty enhanced by means of rhodium plating. Most of all the rhinestone jewelry on the market today is plated with rhodium. It does not tarnish nor does it lose its brilliance for long periods of wear. Sterling silver, brass and copper are all plated with rhodium.

In the manufacture of small watches most of the intricate parts are rhodium plated. It has been found that even glassware can be plated with this metal.

RHOPLEX RESINS

Properties:

The deposit is hard and not scratched easily.

The coating is durable even under adverse weather conditions.

The high temperatures of the arc lights do not affect it.

It is non-oxidizable.

It is bright and no after polishing is required.

It possesses a high specular reflection over a wide color range.

RHONITE RESINS

Trade name for a series of urea-formaldehyde resins. They are available in a number of forms, such as paste, clear solution, aqueous emulsion.

Uses:

Textile finishing.

RHOPLEX RESINS

Trade name for a series of clear, odorless synthetic resins.

Properties:

Translucent, water dispersions: insoluble in water, soap solutions, alcohol, tetrachloride, naphtha, etc. The films are soluble in chlorinated hydrocarbons, coal-tar hydrocarbons, ketones, ester alcohols, ethers, ether esters.

Uses:

Textile finishing.

RHUS GLABRA

See Sumac.

RHOTEX A-20

Trade name for the sodium salt of a polymerized resin. It is a viscous, amber, aqueous gel.

Solubility:

Soluble in water.

Insoluble in organic solvents.

Uses:

Thickening agent for solvent gums.

Solvent resistivity coatings.

Adhesive compounder.

RHOTEX SIZE

Trade name for the sodium salt of polymerized acrylic acid. It is similar to Rhotex A-20 except that it is higher in solids content and less viscous.

Uses:

Used in conjunction with starch and replaces part of the starch already employed. It is claimed to produce a tougher and more flexible size and to reduce the tendency of the starch to shed. It has been found useful in plasticizing domestic corn starches to give them the properties of the imported root starches.

Replaces natural gums.

RICINOLEYL GLYCERIN

See Glyceryl Monoricinoleate.

RICINUS OIL

See Castor Oil.

ROCK WOOL

See Mineral Wool.

ROSE OIL (Ottó of Rose Oil)

A transparent liquid oil which comes in colors ranging from pale yellow to pale green to pale red. It is mild with a sweet taste and a pleasant, strong, fragrant odor. At ordinary temperatures it is a semi-solid.

Properties:

Specific gravity0.845-0.865

Solidifying point18-37°C.

Saponification value10-17

Acid value0.5-3

Uses:

An odorant.

ROSIN

Substitutes:

Rhodinol.
Rose oil in conjunction with citronella.
Geraniol.
Nerol.
Phenyl ethyl alcohol.

ROSIN

See Acaroid.

ROTENONE (Tubatoxin, Nicouline)

White crystals which are odorless.

Properties:

Specific gravity1.27 (20°C.)

Melting point163°C.

Solubility:

Soluble in ether, alcohol, acetone, carbon tetrachloride, chloroform, etc.

Insoluble in water.

Uses:

Substitute for pyrethrum as an insecticide.

By itself it may be used both as a stomach poison and a contact poison insecticide.

Substitutes:

Arsenicals and cryolite may serve as substitute stomach-poison insecticides.

RUBBER, CHLORINATED

Nicotine sulfate and organic thiocyanates are useful as contact insecticides.

Thanite.

ROTTENSTONE

See Tripoli.

ROUGE

A red pigment used as a polishing agent.

It is claimed that a product named "Chromitron" is superior to this for the same purpose.

RUBATEX

Trade name for a cellular expanded rubber.

Uses:

Shock absorbers, sound insulation, heat insulation, electrical insulation, buoyancy, gaskets, weather stripping.

When this product is reinforced with wire mesh, in the form of rigid boards it makes good structural material.

RUBBER, CHLORINATED

A white granular powder. It is odorless, tasteless, non-inflammable and non-toxic. It is obtained from rubber and chlorine.

RUBBER, NATURAL

Properties:

Specific gravity1.64

Chlorine content66-68%

Solubility:

Soluble in coal-tar hydrogenated petroleum and ester solvents.

Insoluble in lacquer solvents and alcohol.

Uses:

Paints and varnishes, paper coatings, adhesives, inks, etc.

It is also used in the manufacture of chemical resistant lacquers, concrete floor paints, and in combination with synthetic resin enamels to shorten their drying time.

RUBBER, NATURAL

A great number of substitutes have been offered for natural rubber. These have increased greatly since the import of natural rubber has been practically cut off by the Japanese. Some of the substitutes offered are temporary replacements until more rubber is available. Others have been found to be superior to natural rubber for a particular purpose. Notable among the superior products are the synthetic rubbers which have been developed within the past decade.

Rubber in many everyday articles can be replaced by an ethyl cellulose plastic. This product may be used in hospital sheeting, gun covers, tents, garden hose, gloves, etc. It is claimed to be flexible at very low temperatures and may therefore

be used for electrical insulation in the motors of high-altitude bombing planes. In its general properties it is inferior to natural rubber as it tends to tear more readily and is not as elastic. However, it may be made flameproof.

Another substitute for rubber is a product called Chempruf. This is a rubberless new material which can be used to replace natural rubber in linings. Rubber in erasers may be replaced by a product manufactured from a resin, an oil and a South American gum.

When used in belting rubber may be replaced by leather in many places where the moisture and fumes are not too great. Cotton duck and camel's hair belting have also been found to be applicable for the conservation of rubber in belting.

In the paper industry it has been found that wood stationery deckles on fourdrinier wires are useful as a substitute for sheet rubber. Deckle strips for suction boxes are now being replaced by micarta. On steam valves rubber diaphragms are being replaced by spring copper on control diaphragms. Rubber gasgets on acid tanks are being substituted by sulfite pulp sheets and gaskets on pipe lines are now being made of paper mill jackets with satisfactory results. It is also possible to conserve rubber by substituting leather, cotton impregnated with asphalt or phenolic resin compositions instead of rubber belting. Sulfite pulp sheets, phenolic resin sheets or asbestos may be used for packaging and gaskets in place of rubber.

Shellac has been used as a substitute for rubber in the manufacture of brushes. The shellac is used for the setting of the bristles. In cements for adhering leather or textiles to glass or metals vinyl resin compositions are used. If these vinyl resins are polymerized they may be useful in the waterproofing of clothing.

RUBBER, SYNTHETIC

One of the newest developments in the field of rubber substitutes is the introduction of plastics. It has been reported that a product called "Butacite", which is a polyvinyl acetal resin, can be used instead of rubber in the manufacture of raincoats, hospital sheeting, life rafts and belts, food and water bags, water-proof and oil-resistant suits and surgical plaster. The fabric is coated with this product to produce these new materials. The characteristic surface tack is eliminated by adding Acrawax C.

In the manufacture of dentures acrylic-resin plastics may be used instead of rubber.

A new process has been reported which enables plastics to substitute for rubber in shoe soles and in many other products. In this new process in which the plastic is said to be suspended against the fabric, the resulting product is flexible, resilient and durable.

RUBBER, SYNTHETIC (Lastics)

During World War I when the Germans found that their imports were cut off by the British blockade they turned to an old process of making synthetic rubber. The resulting product was methyl rubber which was inferior to natural rubber but better than none at the time. Dimethylbutadiene was used in the manufacture of this methyl rubber. Following the war the interest in synthetic rubber declined. However, when the British tried to restrict the output of their plantations to keep the price up this interest was again revived and active research was begun. As a result of this Neoprene appeared in 1931. It was the first commercially successful rubber to

make its appearance on the market. Just one year later Thiokol was introduced to the United States. In the year 1935 the Buna rubbers first made their appearance in Germany. The Buna rubbers were superior to the early synthetic rubbers and active research rapidly improved them and extended their uses. However synthesis of the isoprene molecule of natural rubber has not as yet been accomplished and the idea is rapidly gaining pace that this is not at all necessary. The important thing to be remembered is that a molecule is being constructed which is highly elastic and which resembles isoprene.

It has been suggested that the term "synthetic rubber" be restricted to a material which can be stretched at least 200%. If rapidly stretched and then released it retains its original dimensions and in doing so it exhibits the Joule effect.

There are five types of synthetic rubber:

1. Neoprenes (polymers of chloroprene)
2. Thiokol (reaction products of aliphatic dihalides with alkali polysulfides).
3. Buna rubbers (co-polymers of butadiene with other polymerizable compounds).

Per-bunan — copolymer of butadiene and styrene.

Buna S—copolymer of butadiene and styrene.

Buna N—copolymer of butadiene and acrylonitrile or vinyl cyanide.

Ameripol, Hycar, Chemigum.

4. Plasticized polymers of vinyl chloride.

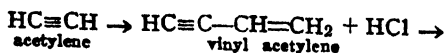
Koroseal, Korogel, Flamenol.

RUBBER, SYNTHETIC

5. Polymers of isobutylene.

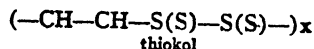
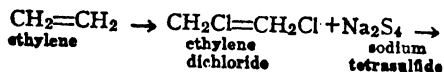
Vistanex, Butyl rubber.

Neoprene is a polymer of chloroprene which is manufactured from chlorine and acetylene according to the following scheme:



Sulfur is unnecessary for its vulcanization but the presence of metallic oxides, particularly zinc oxide, is required. It is more expensive than natural rubber but it is said to be much more resistant to oils and sunlight. Because of this property it is very well suited for covers for gasoline and oil hoses. For additional information see under Neoprene.

Thiokol is a polysulfide rubber manufactured in the United States. It is said to be the most oil-resistant of all the synthetic rubbers. Its tensile strength is fair. It is manufactured according to the following scheme:



It is used mainly in gasoline hose linings and in self-sealing gasoline tanks. Its use has also been extended to include the water-proofing of fabrics.

Butadiene is the basis of the Buna rubbers. These are the best known and most publicized of all the synthetic rubbers. There are various types such as Buna S, Buna N, Perbunan, Ameripol, Hycar, Chemigum, etc. The term "buna" is derived from the first syllable of butadiene and the chemical symbol for sodium

which takes place in the reaction. "S" and "N" indicate the sulfur or nitrogen present.

The Buna rubbers were first developed in Germany. However various chemical laboratories in this country followed up on the work and great advances were made.

Butadiene may be polymerized with styrene or acrylonitrile. If styrene is used the resulting product is Buna S. If acrylonitrile is polymerized with butadiene the product which results is Buna N. Examples of Buna N are Hycar, Perbunan, Chemigum.

Modern research seems to indicate that Buna S is the tire rubber of the future. It is the synthetic which most closely resembles natural rubber. Although its resistance to oils is poor its abrasion resistance, heat resistance, cold flow resistance and aging properties are good. Its electrical properties are excellent.

In contrast to Buna S the Buna N rubbers are quite resistant to oils. Their electrical properties are only fair and their abrasion resistance, heat resistance, cold flow resistance and aging qualities are good.

Isobutylene may be polymerized with butadiene to form butyl rubber. Tests indicate that this product may be used in the manufacture of low grade tires. It is comparatively easy to manufacture and it can be processed much the same as natural rubber. Its electrical and aging qualities are excellent. It is also quite heat resistant. Its abrasion resistance and cold flow resistance are only fair and its resistance to oils is poor. Butyl rubber may be used where resistance to chemicals and oxidation are desirable in preference to tensile strength and resistance to cold flow.

It must be remembered that these synthetic rubbers cannot compete with natural rubber in the manufacture of automobile tires because the cost of production is too high and they have been insufficiently tested as yet. However they do show great promise and in these times when our imports of natural rubber have been so materially reduced they do serve as excellent substitutes. With further research and lower cost of production they show fair promise to replace natural rubber entirely for many purposes. In uses such as gasoline and oil hoses, gaskets, cable jackets, diaphragms, washers, aprons, gloves, rubber

sheeting, etc., they have been shown to be superior to natural rubber.

The manufacture of synthetic rubber is rapidly being advanced. Many new factories are being built under government orders and the hope is that in the very near future the United States will be entirely independent of foreign sources for its rubber.

RYERTEX

See Babbitt Metal.

S

SA 326

Trade name for a product which is claimed to be a substitute for sodium hyposulfite as an antioxidant in soaps.

SACCHAROLACTIC ACID

See Mucic Acid.

SAFFLOWER OIL

An oil obtained from the seeds of *Carthamus tinctorius*. The plant is native to India but its culture was recently started in the United States. When heated to 310°C. for two and a half hours the oil suddenly becomes a gel. This gel, unlike tung oil is soluble in turpentine and other liquids. It dries faster than does soy bean oil and can therefore be used in some paints and varnishes.

SAFLEX

A synthetic resin of the vinyl acetate group.

It is claimed that this product can replace rubber in raincoats and other rubberized fabrics. It also shows promise as a substitute for rubber in extruded rubber tubing. It is a thermoplastic material.

SAFRELLA

Trade name for a product which is claimed may be used as a substitute for artificial sassafras for all technical purposes except in flavor compounds. It is said that its strength is the same as sassafras and its odor is very similar to the latter.

Uses:

Laundry soaps, insecticides, germicides.

SAGO DEXTRIN

See Dextrin.

SALT CAKE

Mixture of sodium sulfate, sodium bisulfate, calcium sulfate, iron sulfate, iron oxide, magnesium sulfate, silica and sodium chloride. This mixture is mainly sodium sulfate with the other constituents as impurities. World War II cut off all foreign shipments. It is mainly used in the kraft paper industry for making sodium sulfide which is required in the pulp cooking process.

There is now being manufactured in the United States a synthetic salt cake which is essentially a sintered composition of sulfur and soda ash in such proportions as to make the chemical equivalent of salt cake in sodium oxide and sulfur content.

SANTOWAX

Trade name for a synthetic wax which is claimed to be an excellent replacer for vegetable waxes as plasticizers and lubricants. It may also be used in the manufacture of polishes, floor waxes, candles, etc.

SAPONIN

An amorphous, white glucoside with a pungent taste and odor. It is obtained from the roots of *saponaria officinalis* by extraction.

Solubility:

Soluble in water.

Uses:

Substitute for soap.

It is also used as an emulsifying agent in many industries.

It is an ingredient of carbonated beverages.

It is used as a foam producing agent.

Other uses include: ingredient of fire-extinguishing solutions, toothpastes, preservative for rubber latex, etc.

It is understood, naturally, that when used in such products as carbonated beverages, toothpastes, etc. only the non-poisonous type is utilized.

SAPPHIRES

Synthetic sapphires are being manufactured in the United States. These pro-

ducts are aluminum oxide which is crystal clear. It is also called corundum. These synthetic sapphires are next to diamond in hardness and for this reason they are being used to replace the synthetic jewels which were formerly imported from abroad.

Uses:

Jewel bearings of chronometers, compasses and electrical, fire-control and aircraft instruments.

Thread guides in textile mills.

Orifices for flow meters.

SAPPHIRES, SYNTHETIC

Synthetic sapphires have been used as pivot bearings in small electric motors. It has recently been reported that a new type of high-alumina content glass can replace them satisfactorily. This new glass can be hot-formed into very tiny bearings with good results.

SARAN

Trade name for a co-polymer of vinyl and vinylidene chloride.

Properties:

Specific gravity1.6-1.75

Refractive index1.60-1.63

Elongation10-40%

Specific heat

32 calories per °C. per gram.

Softening point210-325°F.

SARDINE OIL

Solubility:

Unaffected by water, weak acids, weak alkalis, brine, straight chain alcohols, aromatic hydrocarbons, nitroparaffins.

Slightly affected by strong acids and strong alkalis.

Uses:

Substitute for metal pipes. This product is now being made in various pipe sizes. This pipe can be cut and threaded. It can also be welded by heat alone. It is being mentioned as a possible substitute for brass and copper pipes. It may be used at temperatures up to 175°C. It can readily be heated and bent.

Saran can replace scarce metals in acid, alkali and corrosion resistant equipment. It may replace lead in pipes.

In the form of sheets it may be used as a lining for tanks for chemical resistance.

In the form of rods it can be adapted to screw machine work. As tape it may be used as bottle cap liners and moisture proof electrical installations.

In the form of pipe it may also serve as a substitute for hard rubber, cast and laminated phenolics, chemical glass, etc.

Chemical conveyor belts may be made of Saran.

SARDINE OIL

A pale yellowish liquid which is obtained from sardines by treatment with boiling and pressing.

SASSAFRAS OIL

Properties:

Specific gravity0.9274-0.9330

Melting point28-36°C.

Saponification value189-193

Acid value4.25

Iodine value181-193

Refractive index1.4802-1.4808

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

In leather and chamois dressing it may be used in place of cod-liver oil.

It is also used as an ingredient of asbestos cements, protective coatings, waterproofing coatings, matchhead compositions, fish oil emulsions, lubricating compositions, lard substitutes, candles, printing inks, insecticides, lubricating agent, soapstock, dressing for oiled fabrics.

In the manufacture of linoleum and oil-cloth it may be used as a substitute for linseed oil.

SASSAFRAS OIL

A yellowish liquid oil. It possesses an aromatic odor and taste.

Properties:

Specific gravity1.065-1.095

SAWDUST HOUSES

Solubility:

Soluble in alcohol, ether, chloroform, glacial acetic acid and carbon bisulfide.

Uses:

An odorant.

Substitutes:

So-frass No. 3.

Form-o-sass.

Safrella.

SAWDUST HOUSES

In Great Britain where housing facilities are needed urgently there is used a combination of softwood sawdust, chalk, flour, cement and certain undisclosed ingredients for the prefabrication of a type of residential unit.

SCAMMONY RESIN (Resin of *Ipomea*)

A resinous mixture which is obtained when the scammony root is extracted.

Uses:

Medicine.

Substitutes:

Jalap resin.

SESAME OIL

SCHWARZA FIBER

Trade name for a German synthetic fiber. It is claimed that this product is a rayon obtained by the stretch spinning method.

SEA MOSS

See Irish Moss.

SEED OIL

See Cottonseed Oil.

SENEGAL GUM

See Arabic Gum.

SERICOSE

See Cellulose Acetate.

SERRID OPTONE

Trade name for a product which may be used as a substitute for pyrethrum in insecticides.

SESAME OIL (Benne Oil, Beni Oil, Teal Oil, Teel Oil, Til Oil, Gingelly Oil, Gingily Oil, Gingili Oil, Gigily Oil)

A yellow liquid oil which does not turn rancid.

SEYBOLITE

Properties:

Specific gravity	0.9210-0.9244
Melting point	26-32°C.
Saponification value	188-193
Iodine value	103-114
Refractive index	1.4748-1.4762

Solubility:

Slightly soluble in alcohol.

Soluble in chloroform, ether, benzene, carbon bisulfide.

Uses:

In general it is used much like olive oil.

Substitutes:

Sunflower seed oil.

SEYBOLITE

Trade name for a series of molded products and panels. It is available in various forms.

1. A fiber-graphite material which is hard and dense and about half the weight of aluminum. Its tensile strength runs up to 17,000 pounds per sq. in. Its compression resistance is said to be up to 90000 pounds per sq. in. It is claimed to be highly resistant to moisture, acids, alkalies and fire. It is readily workable with hand and machine tools and so conductive to electricity that it may be electroplated.

2. A hard non-conductive fiber-asbestos material which is produced mainly in the form of thin panels for lamination to the surfaces of fiber-graphite panels and

SHEET METAL

thus changing their electrical characteristics.

3. A moldable fireproof fiber material in which is included powdered marble or some other natural rock. It is said to be heavier than the fiber-graphite but it may be machined like it.

SHARK LIVER OIL

A yellowish brown liquid which is obtained from the livers of the shark, *Hypoprius brevirostris*.

Properties:

Specific gravity	0.9286
Refractive index.....	1.4743
Iodine value	155

Solubility:

Soluble in chloroform, ether, benzene and carbon bisulfide.

Uses:

As an important source of vitamin D it has been found to be an excellent substitute for cod-liver oil.

It is also used in leather dressing, paints and varnishes.

SHEET METAL

Many substitutes have been suggested for flat sheet metal. Among the most important is plywood. It is suggested that this is the universal substitute for sheet metal. It can be bent to shape and easily

SHELL BENZO-SOL

formed. It is also strong enough for most purposes. It is claimed that plywood can be cut with a power shear, riveted and punched. It holds nails and screws better than ordinary metal does.

A very dense material constructed of cement and asbestos under great pressure may also be used. It is called transite. It is claimed that this material is fireproof and can be cut with a saw and drilled.

SHELL BENZO-SOL

Trade name for a closely fractionated straight run petroleum which is cut with a boiling range close to that of benzene. It is claimed to be a much closer benzene substitute than any other on the market.

Uses:

Extraction solvent for animal, vegetable and essential oils.

Rubber solvent.

Benzene substitute in the manufacture of quick drying paints, lacquers, stains, and paint and varnish removers.

SHELLAC (Lac)

A resinous material secreted by an insect and deposited on the limbs of various trees. The natural habitat of this insect is India, Siam and Indo-China.

This resin is ground, washed, refined, strained and then allowed to cool. The resultant product is the orange shellac known to commerce. This is bleached to produce white shellac.

Properties:

Specific gravity1.08-1.13

Saponification number194-213

Acid number48-64

Solubility:

Soluble in methyl alcohol, ethyl alcohol, amyl alcohol.

Uses:

In the manufacture of varnishes, leather dressing, polishes, phonograph records, sealing waxes, inks, paper manufacture, etc.

In thermoplastic compositions.

In insulating cylinders.

Substitutes:

Vinsol resin may substitute for shellac in thermoplastic compositions.

Phenolic resins have been shown to be useful in place of shellac in high voltage insulating cylinders.

Dur-lac and soluble copals have been found applicable for solutions in alcohol and aqueous alkali in place of shellac.

Any of the following may be tested for their usefulness as substitutes for shellac: alverlac, cal-lac, casein, cashellac, clearlac, lignolac, perfection lac, sheelac, tung oil fatty acids.

Petrex may be used as a substitute for shellac for many applications.

In Russia it has been found that solutions of polyvinyl chloride may be used as substitutes for shellac in the manufacture of phonograph records.

SHELLACOL

SILICA GEL

SHELLACOL

Trade name for a mild alcohol-type solvent. It may be used in place of the completely denatured alcohols for practically all purposes in the paint industry.

SHIU OIL (Apopino Oil)

An essential oil high in linalool content and sold as a substitute for linalool oil. It is probably adulterated because the samples analyzed show great variations in their physical properties.

It is a Japanese product and therefore cannot be obtained today.

SHUMAC

See Sumac.

SILENE

Trade name for a new pigment which is said to be a calcium silicate. In its final form it contains 5% free and 15% combined moisture. It is a white pigment and it is claimed to be a useful substitute for zinc oxide as a filler for rubber.

SILEX

See Flint.

SILICA (Silicon dioxide; Quartz) SiO_2

Properties:

Form crystalline, amorphous
Colorwhite or colorless
Specific gravity.....crys. 2.319-2.653
amor 2.20
Melting pointcrys. 1750°C.
amor. 1600°C.

Solubility:

Insoluble in water; soluble in hot alkalis and hydrofluoric acid.

Uses:

As a substitute for activated carbon it may be used as a filtering, clarifying, decolorizing and absorptive agent.

SILICA GEL

Trade name for an incompletely dehydrated silicic acid. It is extremely porous which makes it absorb large quantities of liquids and vapors.

Both chemically and physically it is very stable. It is also non-deliquescent. It may easily be reactivated by heating and it will stand an unlimited number of reactivations.

Uses:

Dehydrating agent.
Air conditioning.
Carrier for active catalysts.

Substitutes:

Activated alumina.

SILICATE COTTON

See Mineral Wool.

SILICON DIOXIDE

See Silica.

SILVER Ag

A lustrous white metal which is soft, ductile and malleable. It is an excellent conductor of heat and electricity.

Properties:

Specific gravity10.53

Melting point961°C.

Boiling point1955°C.

Solubility:

Soluble in nitric acid, hot sulfuric acid and alkali cyanide solution.

Insoluble in water and alkalis.

Uses:

Silver has attained an important position as a substitute for metals which are difficult to obtain today. It may be used in place of copper, nickel, chromium, and zinc in many of their applications.

It has been found that silver can be used in soft soldering compounds thus saving tin. Lead-silver alloys have largely replaced the ordinary lead-tin solders.

Because of its excellent electrical properties silver may be used to replace copper in bus bars. It can also be used successfully for brazing copper pipes.

A number of interesting silver alloys have been developed. Among them may be listed the following:

Aluminum-silver.—This contains about 8% aluminum. It is claimed to possess a Brinell hardness of 225 after the proper heat treatment.

Beryllium-copper-silver.—This alloy can be heat treated.

Cadium-silver. — Used in solders and electrical contacts. Its strength is good both at room and elevated temperatures.

Cadium-copper-silver. — Used in the manufacture of bearings. Some lubricating oils attack these alloys at elevated temperatures. It has been suggested that an indium coating will overcome this difficulty.

Silver-carbon.—Used in electrical contacts and brushes.

Chromium-copper-silver.—This alloy is claimed to be stronger than some kinds of steel. It can be used for fuse clips in high temperature switching devices.

Copper-Silver.—The annealing temperature of copper is raised by incorporating a small percentage of silver. The resulting product is a high electrical conductivity alloy. It may also be used as a welding rod.

Magnesium-silver. — Used in electrical contacts.

Molybdenum-silver.—Used in electrical contacts and spot welding electrodes.

Silicon-silver.—This alloy is said to be corrosion resistant.

Zinc-silver.—Used in electrical contacts.

Aluminum-silicon-silver.—A low expansion piston alloy.

SILVER WHITE

Silver plate has been found to be an excellent substitute for stainless steel, nickel, chromium and sheet aluminum.

Silver electro-deposits are being investigated as a substitute for nickel as an undercoating for chromium plating. It may also be used on cans in place of tin.

Sterling silver has replaced nickel as a base for rolled gold plate.

Strange as it seems silver today is the cheapest metal than can be obtained without priorities.

SILVER WHITE

See Cremnitz White.

SLAG WOOL

See Mineral Wool.

SLAKED LIME

See Lime, Hydrated.

SLATE FLOUR

A solid which is grayish in color and amorphous in structure.

Properties:

Specific gravity2.6-3.3

SOD OIL

Uses:

Substitute for aluminum powder in the manufacture of paints.

SLATE FLOWS

See Barium Sulfate.

SLATITE

Trade name for a cellulose-base, air drying enamel. It gives a finish resembling slate on wood, fiber, wallboard, cardboard, pressed paper, etc.

SOAPS, ACID

When an acid is added to a dissolved soap in quantities just small enough so as not to produce separation of the fatty acids this acid soap is obtained.

It is used primarily to replace Turkey red oil in dyeing.

SOAPSTONE

See Talc.

SOD OIL

See Degras.

SODA ASH

SODA ASH Na_2CO_3

Sodium carbonate of commerce. A whitish powder.

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

It has been found that soda ash may serve as a substitute for manganese in desulfurizing steel.

SODIUM ACID CARBONATE

See Sodium Bicarbonate.

SODIUM ACID CHROMATE

See Sodium Bichromate.

SODIUM ALGINATE (Algin, Alginic Acid)

A solid material extracted from sea kelp. It is white to dark brown in color. It is a hydrophillic, vegetable colloid.

Properties:

pH5-10

Moisture content5-20%

Solubility:

Soluble in water.

SODIUM BICARBONATE

Uses:

Substitute for gelatin, gums such as tragacanth, karaya, acacia and locust bean gum. It also replaces Irish moss and agar-agar.

SODIUM ACID SULFATE

See Sodium Bisulfate.

SODIUM BICARBONATE (Baking Soda, Sodium Acid Carbonate) NaHCO_3

A white powder or crystalline lumps. It is somewhat alkaline in taste. It is obtained when carbon dioxide is allowed to flow into a solution of salt and ammonia. There are other methods for its preparation all of which use carbon dioxide.

Properties:

Specific gravity2.20

Melting point

At 270°C. it loses carbon dioxide

Solubility:

Soluble in water.

Insoluble in alcohol.

Uses:

As a substitute for ammonium bicarbonate in baking powders and in fire extinguishing compounds.

It is also used in the production of effervescent salts and beverages, artificial mineral waters, etc. The tanning indus-

SODIUM BICHROMATE

try finds great use for this compound. It is used furthermore in the manufacture of pottery, porcelain, in the textile industry, and as a preventer of timber mold.

SODIUM BICHROMATE (Bichromate of Soda, Sodium Dichromate, Sodium Acid Chromate) $\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$

Red deliquescent crystals.

Properties:

Molecular weight298.05
Boiling pointdecomposes
Melting point320°C.
Loses water at 100°C.
Specific gravity2.52

Solubility:

Soluble in water to a clear solution.

Uses:

A cheap substitute for potassium bichromate.

SODIUM BISULFATE (Sodium Acid Sulfate, Niter Cake) NaHSO_4

A white crystalline powder.

Properties:

Specific gravity2.435
Melting point300°C.

SODIUM CHLORATE

Solubility:

Soluble in water. Its aqueous solution is strongly acid.

Decomposes in alcohol.

Uses:

Sulfuric acid substitute in dyeing.

SODIUM BORATE

See Borax.

SODIUM CELLULOSE GLYCOLATE

A material which may be used as a substitute for vegetable gums in the paint, textile and adhesives industries.

SODIUM CHLORATE NaClO_3

Colorless crystals which are odorless. They are obtained when a concentrated solution of alkaline sodium chloride is heated and electrolyzed. It is advisable not to titrate this material with any combustible material.

Properties:

Specific gravity2.490
Melting point255°C.
Boiling pointdecomposes

Solubility:

Soluble in water and alcohol.

SODIUM DICHROMATE

Uses:

As a herbicide.

Substitute for potassium chlorate in many applications.

Substitute for ammonium sulfocyanate as an ingredient of match-head compositions and weed-killers.

Oxidizing agent, recovery of bromine from natural brines, in leather tanning and finishing and in textile dyeing.

SODIUM DICHROMATE

See Sodium Bichromate.

SODIUM HYDROXIDE (Caustic Soda) Lye, White Caustic) NaOH

A deliquescent, white material available in the form of lumps, sticks or pieces. It may be obtained as a result of the electrolysis of sodium chloride.

Properties:

Specific gravity2.13

Melting point318°C.

Solubility:

Soluble in water, alcohol and glycerol.

Uses:

As a drying agent it may be used in place of calcium chloride.

A great many other uses have been found for sodium hydroxide. It has found applications in the following industries:

SODIUM HYPOSULFITE

abrasives, adhesives, agriculture, automotive, brewing, building, ceramics, coal by-products, disinfectant, cosmetics, dye, electrical, explosives, fats and oils, food, forest products, glass, glue, gelatine, ink, laundering, lubricant, metallurgical, milling, mining, paints and varnishes, paper, petroleum, photographic, plastics, rayon, resins, rubber, sanitation, soaps, sugar, textile and others.

SODIUM HYPOSULFITE (Sodium Thio- sulfate, Hypo, Sodium Subsulfite) $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$

White crystals.

Properties:

Specific gravity1.729

Melting point48°C.

Boiling pointdecomposes

Solubility:

Soluble in water and oil of turpentine.

Insoluble in alcohol.

Uses:

Photography.

An antioxidant in soaps.

Substitutes:

Indalone.

SA326 (an organic amine).

SODIUM LACTATE

SODIUM LACTATE $\text{CH}_3\text{CHOHCOO Na}$

A very hygroscopic, colorless or yellowish liquid.

Properties:

Freezing point -76°F .

Solubility:

Soluble in water.

Uses:

Substitute for glycerin in textile processing.

SODIUM NITRATE (Nitratine) NaNO_3

Saline crystals which are colorless, odorless and transparent. It is obtained by extraction from caliche (Chile saltpeter).

Properties:

Specific gravity2.267

Melting point 316°C .

Boiling pointdecomposes

Solubility:

Soluble in water and glycerol.

Practically insoluble in alcohol.

Uses:

As a fertilizer it may be used in place of calcium cyanamide.

SODIUM STEARATE

It may also be used in the manufacture of sulfuric and nitric acids.

It is used as an oxidizing agent, as a flux, in the manufacture of glass, etc.

SODIUM SILICOFLUORIDE (Sodium Fluosilicate, Salufer) Na_2SiF_6

A white granular powder which is odorless and tasteless. It may be obtained as a product of the reaction between fluosilicic acid and sodium carbonate.

Properties:

Specific gravity2.755

Melting point
decomposes at red heat

Solubility:

Practically insoluble in cold water.

Insoluble in alcohol.

Uses:

A raw material in the manufacture of ceramic ware in place of cryolite.

It is also used in medicine as an antiseptic, as an insecticide, a reagent in the treatment of hides and skins to facilitate tanning, a reagent in the manufacture of zirconium oxide pigment, etc.

SODIUM STEARATE

See Ammonium Stearate.

SODIUM SUBSULFITE

SOLDER

SODIUM SUBSULFITE

See Sodium Hyposulfite.

SODIUM TETRABORATE

See Borax.

SODIUM THIOSULFATE

See Sodium Hyposulfite.

SOJA-BEAN OIL

See Soy-Bean Oil.

SOL LUSTRE

Trade name for a product which is amber to claret colored. It is a liquid oil.

Solubility:

Soluble in water.

Uses:

Substitute for sulfonated castor oil.

SOLDER

Ordinary solder is an alloy containing equal parts of lead and tin. It melts at about 188° C. These constituents vary ac-

cording to the purpose for which the solder is intended. It is possible to alter the melting point, solidifying point, tensile strength and all the other properties merely by altering the amount of each constituent.

It has recently been found that by adding antimony to solder up to 7% a satisfactory product is obtained for general use. Cadmium can be substituted for the tin in larger portions than antimony. Up to 65-80% cadmium can be used to replace tin directly with no serious loss except in tensile strength.

Lead-tin-cadmium alloys generally show a beneficial rise in the capillary test. It is claimed that these alloys are well suited for soldering where capillary action is used. A low temperature should be used.

Bismuth alloys are more difficult to handle than the standard solder. The melting point is low and the cost is high. However, an acceptable joint is obtained by the use of these alloys.

Zinc cannot be used in solders.

Mercury gives solders with low melting points. However, it is never used in major quantities. Larger lead content may be used with excellent results.

It has been reported that the best results are obtained with solders in which the tin content has been reduced.

Lead-cadmium solders are satisfactory but it was found that they possess high melting points.

Cadmium-zinc solders have also been found to be satisfactory but in this case it was difficult to tin the joints. More cadmium is used than in the lead series. A higher melting point is obtained.

SOLVAMYL

SOY-BEAN OIL

SOLVAMYL

Trade name for a concentrated proteolytic enzyme which may be used as a substitute for malt diastase. It gives a more rapid desizing of textile materials before they are bleached and dyed.

SOLVITEX BG and ST

Trade name for thickening agents which are available both in the flake and fine grain form.

Solubility:

Soluble in cold water.

Uses:

Substitutes for British gum and tragacanth in the printing of textile materials.

SONOTUBE

Trade name for a specially constructed laminated, spiral-wound, wax-treated fiber tube which may be used as concrete pier forms. These tubes are available in various lengths and are cut to size on the job. This may be done by hand or power saw.

It is claimed that these tubes are easy to handle, easy to set into place and need not be stripped off after the piers are set up.

SOVPRENE

A synthetic rubber which is manufactured in Russia. It is said to be a polymer of butadiene which is obtained from alcohol and petroleum still gases. Satisfactory tires are reported to have been manufactured from it.

SOY-BEAN OIL (Soja-Bean Oil, Bean Oil, Chinese Bean Oil, Soy Oil)

A natural pale yellow oil. It is obtained by pressing out soya-beans.

Properties:

Specific gravity0.924-0.929

Melting point22-31°C.

Refractive index1.4760-1.4775

Saponification value190-200

Solidifying point-15 to -8°C.

Iodine value121-139

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

Substitute for linseed oil.

It is also being substituted for tung oil in the manufacture of paints.

The oil is claimed to be an economic rival of cottonseed and peanut oil in the vegetable oil market.

The following can be produced from soy bean oil:

SOY BEAN PROTEIN

Glycerine, printers' ink, waterproofing for fabrics, leather dressing, paper coating and sizing, lubricating oil, lighting oil, enamels, varnishes, paints, soap, rubber substitutes and lecithin. Plastics and fibers can also be made from this oil.

When sulfonated it may be used as a substitute for sulfonated castor oil.

SOY BEAN PROTEIN

Soy bean protein is obtained from the meal which remains after the oil is pressed out. On solution it yields a viscous solution which is used in the manufacture of fibers.

This protein resembles casein very closely. As a matter of fact it has been suggested as a substitute for casein in the paper industry and in the plywood industry as an adhesive.

It may also find use in paper sizing, water paints, plastics for buttons and buckles, leather dressing and adhesives, as an emulsifying agent for mineral oils or fats, stabilizing agent to inhibit the rancidity in fats or glue, bleaching agent for wheat flour, core binder, clarifying agent for aging alcoholic distillates from grain, component of a polishing or finishing wax, wetting-out agent.

It may also serve as a substitute for egg yolk in the manufacture of ice cream, candies and similar food products.

The possibility of making a wool-like fabric from soybean protein is being investigated. It has been found that the finished fiber is white to light tan in color with a medium luster. It has a warm, soft feel with a natural crimp and a high degree of resilience. It is said to be highly resistant to carbonizing and to boiling

SPECULUM

in dilute acids and alkalies. It is reported to be more resistant to the action of molds than is casein fibers.

A rubber like material obtained from soy bean protein has recently been patented. It is claimed by the inventor that this material is more elastic than natural rubber and that it possesses greater strength. It is entirely unaffected by fats, oils and grease. It is suitable for gaskets and similar articles.

SOY OIL

See Soy-Bean Oil.

SPANISH WHITE

See Bismuth Subnitrate.

SPECIAL DIAMALT

See Diastase, Malt.

SPECULUM

An alloy consisting of 66 parts of copper and 33 parts of tin with a trace of arsenic.

This alloy is similar in appearance to polished silver. It does not tarnish appreciably and it is corrosion resistant. In hardness it is between nickel and chromium.

SPERM OIL

Uses:

It has been suggested that speculum metal may be used as a substitute for nickel chromium finishes.

SPERM OIL

See Whale Oil.

SPIEGEL

See Spiegeleisen.

SPIEGELEISEN (Spiegel)

A low grade ferro-manganese which is an alloy of iron and manganese. Its manganese content is low.

Properties:

Melting point1950-2265°C.

Uses:

A substitute for manganese in the making of steel.

SPIRIT OF TURPENTINE

See Turpentine Oil.

SPIRIT VARNISH

See Acaroid.

STARCH GUM

STANNIC ANHYDRIDE

See Stannic Oxide.

STANNIC OXIDE (Stannic Anhydric, Tin Peroxide, Tin Dioxide, Flowers of Tin, Tin Ash, Tin Anhydride) SnO_2

A white crystalline powder.

Properties:

Specific gravity

6.6-6.9 (amorphous)

6.7-6.85 (crystalline)

Melting point

1127°C. (amorphous)

infusible (crystalline)

Solubility:

Soluble in concentrated sulfuric acid.

Soluble in fused alkalis.

Uses:

In enamels and glazes.

Substitutes:

Zirconium silicate, zirconium oxide, antimony oxide, titanium oxide, leukonin.

STARCH GUM

See Dextrin.

STAYBELITE

STAYBELITE

Trade name for a hydrogenated rosin produced from the southern pine. It is a clear, pale yellow, non-hygroscopic solid. It is said to contain only the acid and non-acid constituents of rosin which are partially or completely saturated with hydrogen.

Properties:

Melting point	168°F.
Saponification value	167
Iodine number	135
Refractive index	1.5270 (20°C.)
Tensile strength..	92 lbs. per sq. in.

Solubility:

Soluble in toluene, turpentine, alcohol, butyl acetate, cresols, acetone.

Uses:

Modifying synthetic resins in protective coatings, rubber-base pressure sensitive adhesives, hot melt laminants and coatings, in some types of chewing gum base.

It serves as a softener, tackifier and plasticizer in crude natural rubber.

Since it is odorless it may serve to replace other softening agents which impart an odor to the finished product.

It is used in tire carcasses and tread stocks as a partial replacement for fatty acids such as stearic acid.

It may be used in rubber reclaiming.

It is a useful ingredient of cable paper saturants, in the sizing of paper, in the paper-converting field, in the production

STEARIC ACID

of speciality greases and lubricants, in ceramic printing.

STEARIC ACID (Stearinic Acid, Cetyl-acetic Acid, Stearnophanic Acid)

A wax-like material which is colorless and odorless.

Properties:

Specific gravity	0.847 (69.3°C.)
Melting point	69.3°C.
Boiling point	291°C.

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide, carbon tetrachloride.

Slightly soluble in water.

Uses:

Substitute for naphthenic acid in rubber compounding.

Plasticizer in compounding rubber or synthetic products.

Substitutes:

Theop may serve as a substitute for stearic acid in rubber or synthetic elastic products.

It is claimed that if stearic acid is replaced by ammonium stearate paste it tends to prevent the dry material from flying off in mixing.

STEARINIC ACID

See Stearic Acid.

STEARNOPHANIC ACID

See Stearic Acid.

STEATITE

See Talc.

STEEL

Many substitutes have been suggested for steel and steel products. Since steel is used for such a great number of purposes and products as many substitutes as uses have been forwarded. It would be best to list them.

The strength of cold drawn chromium-molybdenum alloy steel is well known. It has been reported that it may be replaced by an alloy containing no chromium. As a matter of fact this new alloy requires no virgin alloying elements of any kind. The alloys are all obtained from scrap.

In many instances reinforced concrete and wood will serve just as well as steel.

In acid tanks lead coated steel rods can replace stainless steel.

In automobile bodies and parts plastic panels and fiber laminated plastics can replace steel.

Laminated plastic plywood can replace steel in bicycle frames.

Lead has been found to be satisfactory for cold acid and blow pit drains. Cast iron has been used for digester blow lines after the blow valve.

Building steel is being replaced by concrete and lumber.

Preformed plastics are being used in camera cases and miscellaneous parts instead of steel.

Wooden clothes poles and fences are rapidly coming back into the lime-light.

In the construction of houses lighter steel and wood are being used for many items.

Steel containers are being replaced by plastic lined wooded or cardboard containers.

Cooking utensils which at one time contained chromium and nickel are now being made of porcelain enamel.

Preformed plastics are being used in the construction of developing trays for dark rooms, in electric motors, fan housings and gears.

Table tops are made of laminated wood.

Resin bound plywood is being considered for the construction of fan blades.

Asbestos is used in place of galvanized sheets.

Wood stave pipes are used for above ground water lines in place of steel pipes

It has been found that micarta sheets with drilled holes are quite satisfactory in place of stainless steel plates on a pulp sliver screen.

Stainless steel used in pumps is being replaced by enameled impellers.

The refrigerator offers many opportunities for replacing steel in construction. It has been found, for instance, that for eliminators steel can be replaced if coated with an organic material, the surface of which will wet successfully. Silicon bronze and copper may also be used if the price warrants it. Parts which

STEEL

are subject to saturated air such as casings, baffles and fan housings may be constructed of steel coated with chlorinated rubber, baked synthetic enamel, Japan, baked wrinkled enamel. The drip pans, coil casings, etc., which are subjected to wetting may also be made of the aforementioned materials.

Lead may be used in place of steel in piping.

Safety helmets which at one time were made of steel are now being made from preformed plastics.

In the packaging of asphalt fiberboard drums are used.

Business machine parts are now made of preformed plastics.

Hardwood reflectors which are finished with baked enamel having a high reflective factor are replacing steel reflectors.

It has been suggested that transite pipe may replace steel pipe.

STEEL, Polish Cyanided

Substitute for agate.

STERCULIA GUM

A series of gums which are rather similar to tragacanth in appearance. They differ in their chemical properties however. They are obtained from India, Africa and Australia.

They may be used in place of gum tragacanth.

STRAMONIUM

STIFFENING FABRIC

A new synthetic stiffening fabric has recently been invented. It may be used to replace horsehair in the interlinings of coats, dresses and upholstery.

It is claimed that this fabric is more advantageous to use because it may be made in different sizes and it may also be tapered from end to end. In this manner the stiffness of the material can be varied from point to point as desired.

STONEWALL BOARD

A new asphalt cement sheet which is a hard, rigid, dense, fireproof material. It is claimed that it may be used in place of lumber in interior partitions and for the construction of air conditioning ducts in place of metals.

STRAMONIUM (Jamestown Weed, Thorn Apple, Devil's Apple)

The leaves and flowering tops of the plant *Datura stramonium* which are dried. They usually grow in Europe, Asia and America although they are usually imported from Europe.

The leaves contain the alkaloids atropine, hyoscyamine and scopolamine.

Uses:

Substitute for belladonna.

It has been claimed that the smoking of the leaves relieves asthma.

STROBA WAX

STROBA WAX

Trade name for a light colored hard wax which is compatible with most waxes and resins.

Properties:

Melting point103-106°C.

Solubility:

Soluble (hot) in oils. It forms a gel in cold mineral oil.

Soluble (hot) in hydrocarbons.

Insoluble in water.

Uses:

Substitute for aluminum stearate.

Substitute for carnauba wax.

Flatting agent in paints and varnishes.

In recording waxes, insulating waxes, coatings, etc.

STRONTIUM SULFATE SrSO_4

White crystals of the mineral celestine.

Properties:

Melting point1605°C.

Boiling point
decomposes at white heat.

Specific gravity3.71-3.97

Solubility:

Slightly soluble in concentrated acids and water.

STYRON

Insoluble in alcohol and dilute sulfuric acid.

Uses:

As a substitute for barium sulfate in the manufacture of rubber goods.

STYRENE (Vinyl Benzene)

A clear, colorless liquid. When allowed to stand it polymerizes to a clear, glassy solid.

Properties:

Specific gravity0.904 (25°C.)

Boiling point
81°C. (100mm. pressure)

Flash point-31°C.

Uses:

In the manufacture of polystyrene resins.

Substitute for acrylonitrile in the manufacture of synthetic rubbers.

STYRON

Trade name for a polystyrene resin which is a thermoplastic molding material. It may be used for both compression and injection molding.

It may be obtained in a number of colors.

It is claimed to be weather, age and sunlight-resistant.

SUBLAN

Properties:

Specific gravity1.054-1.056

Tensile strength

5000-9000 lbs. per sq. in.

Solubility:

Insoluble in water, strong and weak acids, strong and weak alkalies and alcohols.

Soluble in ketones, esters, aromatic and aliphatic hydrocarbons, some mineral, animal and vegetable oils.

Uses:

Electrical insulators, high-frequency coaxial cables, decorative items, refrigerator moldings, chemical ware, combs, fish-net floats, optical parts, reflector buttons, containers, dishes, etc.

SUBLAN

Trade name for a product which is claimed to be manufactured from domestic raw materials. It resembles lanolin in appearance. It is a thin paste.

Properties:

Melting point55-60°C.

Solubility:

Insoluble in water, glycerin and in most water-soluble liquids.

SULFAMIC ACID

Uses:

Substitute for lanolin.

Substitute for wool grease in leather stuffing, in the production of lanolin, printing inks and soaps.

SUCROL

See Dulcin.

SUGAR SUBSTITUTES

Honey, maple sugar, corn or sorghum syrup may be used as substitutes for sugar. Dulchin may also be used as a substitute for this material.

The use of saccharine for sugar is an old standby.

SULFAMIC ACID

A colorless, odorless, non-volatile, non-hygroscopic solid.

Properties:

Melting point205°C.

Solubility:

Soluble in water and formamide.

Slightly soluble in methyl alcohol.

Uses:

Flameproofing. When the material or product to be flameproofed is treated with this compound it does not alter the ap-

SULFANILAMIDE

pearance or the feel of the material. The sulfamates do not tend to crystallize on the surface of the material.

Tanning. It is claimed that skins processed with sulfamic acid have a finer and silkier grain than those processed with sulfuric acid. The sulfuric acid may be all or partially replaced by sulfamic acid depending upon the results desired.

Herbicial. Ammonium sulfamate has been found to have a more effective herbicidal action than ammonium sulfate, ammonium thiocyanate, sodium chloride and calcium chloride. It is reported to be equally as effective as sodium chlorate.

Miscellaneous. Under certain conditions it may be used for electroplating metals and for refining metals by electrochemical methods.

Laundry sour, washing rinse or fixing agent for textile dyes, gas liberating compositions, metal polishing compositions, photographic fixing baths, photographic bleaching baths, peptizing pigments, etc. It may be used as a substitute for urea in the dye and pigment industry.

SULFANILAMIDE $C_6H_8O_2N_2S$

White crystals which are odorless.

Properties:

Melting point164.5-166.5°C.

Solubility:

Soluble in acetone, glycerin, hydrochloric acid and water (boiling).

Uses:

Chemotherapy.

SULFONATED OILS

SULFAPYRIDINE

White crystals or powder.

Properties:

Melting point190-193°C.

Solubility:

Soluble in dilute mineral acids.

Soluble in aqueous solutions of potassium and sodium hydroxides.

Uses:

Chemotherapy.

SULFONATED CASTOR OIL

See Turkey Red Oil.

SULFONATED OILS

Sulfonated oils are obtained when animal or vegetable oils are treated with sulfuric acid and then washed to remove the excess acid. The acidic oil is subsequently neutralized with a little caustic soda or ammonia.

These oils are used for a great number of purposes among which may be mentioned the following: as emulsifiers and in the treatment of furs and leathers.

Substitutes:

Turkelene may serve as a substitute emulsifier.

Diglycol laurate is an excellent substitute in the treatment of furs and leathers.

SULFONATED TALLOW

SUPERDEX

SULFONATED TALLOW

Used as a textile finishing agent.

May be replaced by a new product called Avitone.

SULFOUREA

See Thiocarbamide.

SULFURIC ACID (Oil of Vitrol, Dipping Acid) H_2SO_4

When used in the dyeing industry sulfuric acid may be substituted by sodium bisulfate.

G.B.S. Soda may be used as a substitute for sulfuric acid in pickling, dye baths, etc.

It has recently been suggested that sulfuric acid may be used instead of aluminum sulfate in the sizing process.

SUMAC (Shumac, Rhus Glabra)

The twigs and leaves of various species of the Rhus family. This plant occurs in many countries among which are the United States, Italy, Spain, Greece.

Uses:

Tanning processes.

Substitutes:

Tara.

SUMAC WAX

See Japan Wax.

SUNFLOWER SEED OIL

A yellow liquid with a pleasant odor and a mild taste. It is obtained by expression from the seeds of *Helianthus annus*.

Properties:

Specific gravity0.024-0.926

Refractive index1.4611

Iodine value125

Solubility:

Soluble in alcohol, ether, chloroform, carbon bisulfide.

Uses:

Substitute for sesame oil.

SUPERDEX

Trade name for a special starch solution which is very transparent, adhesive and penetrating.

Uses:

Gelatin, glue and gum arabic substitute.

SWEET OIL

SWEET OIL

See Almond Oil.

SYNTHETIC WINTERGREEN OIL

SYNTHETIC GAULTHERIA OIL

See Methyl Salicylate.

SYNPROWAX

Trade name for a synthetic wax which resembles imported montan wax. Its color ranges from pink to deep scarlet.

Properties:

Melting point90°C.

Saponification value78.5

Acid Value23.4

Uses:

Rubber compounding of heels and soles.

In coated paper.

In reclaiming rubber.

Printing inks.

SYNTHENOL

Trade name for a dehydrated castor oil. It is said that it dries rapidly and that it is non-yellowing.

This product is claimed to be a substitute for tung oil.

SYNTHETIC MOLDING RESINS

These are synthetic resins marketed in a form which can be molded by heat and pressure. The finished product may be used for commercial parts and as decorative items. In the manufacture of these products large amounts of inert fillers are used. This application of synthetic resins offers keen competition to hard rubber, pottery, metals, etc.

SYNTHETIC MUGUET

See Hydroxycitronellal.

SYNTHETIC VARNISH RESINS

A special class of synthetic resins which are capable of being kettled with oils so as to produce varnishes after the proper treatment. Within recent years there has been a tendency to use synthetic resins in place of natural resins for this purpose.

SYNTHETIC BARYTES

See Blanc Fixe.

SYNTHETIC WINTERGREEN OIL

See Methyl Salicylate.

SYNTHETIC

SYNTHETIC 100

Trade name for a synthetic rubber-like material which is said to be a polymer of isobutylene.

It is claimed to be resistant to acids and sunlight.

It possesses low permeability and good electrical properties.

It may be used to increase the flexing resistance in rubber stock.

T

TALC $\text{H}_2\text{Mg}_3(\text{SiO}_3)_4$

A hydrous magnesium silicate. In the impure state it occurs in various colors, mostly green; when refined it is white. It is a soft material, easily cut or powdered. It has a soapy feel and is highly resistant to acids, alkalies and heat.

Properties:

Specific gravity2.6-2.8

Occurrence:

United States, Austria, Switzerland, England, Shetlands, Bavaria, Italy, India, South America.

Uses:

When used as a clarifier it may be substituted for activated carbon.

Filler in all kinds of paper, rubber, soap, plastics, cosmetics, paints, etc. Toilet powders, dusting powders, textile finishing, etc.

Substitutes:

Pyrophyllite.

In England it has been found that prepared china clay is an excellent substitute for talc.

TALCUM

See Talc.

TALL OIL

A vegetable oil obtained as a by-product from kraft waste cooking liquors. It is a dark odorous material which consists of a mixture of rosin, fatty acids and other organic compounds.

Uses:

Substitute for pine oil in the manufacture of coated paper. The oil as it is used in this case must be sulfonated.

Frequently used as a substitute for red oil.

The sulfonated oil also replaces sulfonated castor oil in the manufacture of coated paper. It may also be used as a substitute for turkey red oil.

In Germany it has been used as a substitute for linseed oil in conjunction with glycerin.

TALLOW

A fat which is obtained from the solid suet of cattle, sheep or horses.

It is used in the slasher of cotton mills, in soap stock, candles, food, grease, leather dressing, etc.

TALLSO

Substitutes:

Petrolatum and refined wax to some extent. It has been reported that in some cases this may be used but other reports indicate that difficulties were encountered. The use of these two products depends upon the slashing formula.

TALLSO

Trade name for a grade of tall oil.

TANOYL

Trade name for a series of sulfonated oils which are light in color and intended for use on various types of dark leathers. It is said that these oils do not contain any cocoanut oil but non-oxidizing neutral esters of fatty acids.

Uses:

These products may be used as substitutes for coconut oil in the tanning industry.

TANOYL 1230 R

Trade name for an oil which is claimed to be a substitute for coconut oil. It is said to have the identical non-oxidizing qualities required in fat liquoring white leather where any slight oxidization will cause a yellowing of the leather.

TARTARIC ACID

TANOYL 1269

Trade name for an oil made from vegetable oils of American origin. It is said to be an effective substitute for whale oil. In many ways it is claimed to be superior to actual whale oil for tanning purposes. It possesses all the necessary tanning qualities demanded of whale oil.

TAPIOCA (Cassava Starch)

When the starch obtained from the roots of the cassava is heated in shallow pans the resulting product is tapioca. It is formed by the bursting of the starch granules and their adherence. The kernels are irregular and translucent.

It has been suggested that a new cereal starch obtained from maize and other cereals may be used as a substitute for tapioca.

TAPIOCA DEXTRIN

See Dextrin.

TARTAR EMETIC

See Antimony-Potassium Tartrate.

TARTARIC ACID (Dihydroxysuccinic Acid, Dextro-tartaric Acid) $C_2H_2(OH)_2(COOH)_2$

Colorless, transparent crystalline substance.

TARTRATED ANTIMONY

TENITE

Properties:

Specific gravity1.7598
Melting point170°C.

Solubility:

Soluble in alcohol, water, ether.

Uses:

In the printing of textile fabrics.
In the manufacture of essences, jellies
and soft drinks.
In culinary products.

Substitutes:

Glycolic acid.
Phosphoric acid in the preparation of
jellies, essences and soft drinks.
Lactic acid in culinary products.

TARTRATED ANTIMONY

See Antimony-Potassium Tartrate.

TEAL OIL

See Sesame Oil.

TEEL OIL

See Sesame Oil.

TELLURINE

See Diatomaceous earth.

TELUSA FIBER

A synthetic fiber manufactured in Germany. It is said to be obtained in a combination of the viscose and cuprammonium processes. Its tensile strength is claimed to be equal to that of wool. It is also said to have a permanent crimp.

TEMLOK

Trade name for a decorative insulating board with a smooth surface. It is fibrous in structure and claimed to be highly resistant to the passage of heat, to moisture, dry rot, fungus growth, vermin and dust. It is sound insulating and reflects light.

This product is rigid and light in weight. It does not tend to settle or pack down.

TENITE

Trade name for a synthetic plastic available in two forms.

Tenite I. Cellulose acetate.

Tenite II. Cellulose acetate butyrate.

This product is available in many colors and forms. It is thermo-plastic.

Properties:

Specific gravity.....1.20-1.37 (20°C.)
Refractive index1.464-1.499
Tensile strength2800-9900 lbs.
per sq. in.

TERPENE RESINS

Solubility:

Soluble in ketones and certain esters.

Insoluble in vegetable and mineral oils.

Uses:

The plastic can be punched, stamped, drilled and sawed with the ordinary metal and woodworking tools.

The extruded tubing is being used to replace metals, glass and other materials in various types of conduits.

Strips of Tenite are replacing aluminum in card index systems. Wallboard joinings, linoleum trim, sink, shelf and table edgings, toothbrush handles, fishing equipment, kitchen utensils, bathroom fixtures, telephones, fountain pens and pencils, steering wheels, door knobs, cases, radio dials, etc. can all be manufactured from Tenite.

TERPENE RESINS

A new series of hydrocarbon resins which is obtained by catalytic polymerization. These resins are available in a range of melting points and color grades which are comparable to the cumar resins. It is reported that these terpene resins have a somewhat greater usefulness than the cumar resins.

TERPINYL ACETATE

Colorless liquid with a characteristic odor.

TERRA SILICEA

Properties:

Specific gravity0.9705

Melting point-50°C.

Boiling point220°C.

Solubility:

Soluble in alcohol and ether.

Insoluble in water.

Uses:

Substitute for pyrethrum as an insecticide.

TERRA CARIOSA

See Tripoli.

TERRA COTTA

A coarse clay or plastic earth which is baked and then utilized for decorative purposes.

It has been suggested that standard or medium soil or concrete pipes can serve as substitutes for iron or steel sewer pipes and their fittings.

TERRA PONDERAS

See Blanc Fixe.

TERRA SILICEA

See Diatomaceous earth.

TERVAN

TERVAN 935

Trade name for a grease-like material which may be used for lubricating the pump shafts and for the impregnation of pump packing. It possesses an extremely high resistance to nitration and also acts as an ideal bearing lubricant.

TETRACHLOROETHYLENE DICHLORIDE

See Carbon Trichloride.

TETRACHLOROMETHANE

See Carbon Trichloride.

TETRAHYDROFURFURYL ALCOHOL (Tetrahydrofurfuryl Carbinol) $C_4H_7OCH_2OH$

A liquid, water-white in color.

Properties:

Specific gravity1.054 (20°C.)

Refractive index1.4502

Boiling point178°C.

Solubility:

Soluble in water, alcohol, ether.

Uses:

Substitute for sulfonated lauryl alcohol which is used as a wetting or washing agent in textile processes.

THANITE

TETRAHYDROFURFURYL CARBINOL

See Tetrahydrofurfuryl Alcohol.

TETRAHYDRONAPHTHALENE (Tetralin)

A colorless liquid with a pungent odor.

Properties:

Specific gravity0.981 (13°C.)

Boiling point206°C.

Refractive index1.540-1.547

Flash point80°C.

Solubility:

Miscible with most solvents.

Insoluble in water.

Uses:

Substitute for turpentine and turpentine oil.

TETRALIN

See Tetrahydronaphthalene.

THANITE

Trade name for a thiocyno-acetate of a secondary terpene alcohol which is obtained from the Southern pine.

Uses:

Substitute for pyrethrum and rotenone in insecticides.

It is also used as a substitute for derris.

THEOBROMA OIL

See Cacao Butter.

THEOP

Trade name for a product which is claimed to be an excellent substitute for stearic acid in the manufacture of rubber or synthetic elastic products.

THERMOPRENE

Trade name for a product which is reported to be a rubber isomerization product. The unvulcanized material is horny which becomes rubbery when the temperature is raised. When vulcanized with sulfur it produces a hard product which resembles ebonite. It is said to be of high strength and low elongation.

Uses:

The unvulcanized material is used as a paint vehicle.

Both the vulcanized and unvulcanized products are used as stiffeners for rubber.

THIOCARBAMIDE (Thiourea, Sulfoarea)
 $\text{CH}_4\text{N}_2\text{S}$

White crystals with a bitter taste.

Properties:

Specific gravity1.406

Melting point180°C.

Solubility:

Soluble in water, ammonium sulfocyanide solution and ether.

Practically insoluble in cold alcohol.

Uses:

Photography.

Organic synthesis.

Substitutes:

Potassium sodium ferricyanide.

THIOKOL

Trade name for a series of synthetic organic polysulfide rubbers which can be vulcanized. It is claimed that these rubber materials possess excellent heat resistance, good processing characteristics, low permeability, and high oil resistance. Several types are odorless. These are also available in the form of molding powders.

The Thiokols are said to be unaffected by petroleum hydrocarbons, alcohol, esters, and ketones. Some of them do not swell at all in aromatic hydrocarbons, others swell 100%. However, it is claimed that even when swollen the good physical characteristics are retained.

Properties:

Specific gravity	1.34
Tensile strength	1400 lbs. per sq. in.
Maximum temperature for use	200°F.

Uses:

Thiokol is rapidly replacing natural rubber for many uses. It is claimed to be excellent for use where oil and gasoline resistance are a factor. Hose, packing, printing plates, printing rollers, gaskets, self-sealing gas tanks, etc. are some of the products which may be manufactured from thiokol.

This material may be treated by means of a special process with a processed felt base. The resulting product is a spongy rubbery material. This material is weather resistant and satisfactory for certain application which require such a spongy rubber strip.

Thiokol is used in airplane gasoline and lubrication systems. This replaces metal tubing. It may also be used in the construction of crash-resistant gasoline tanks for airplanes. It is also being tested in balloon cell covering cloths for lighter-than-air craft.

In airplanes which are constructed for flying at very high altitudes it has been found that sealing the fuselage, windows and doors with Thiokol is very effective against air sickness in the rarified altitudes.

One of the most interesting uses of Thiokol is in the manufacture of tires.

THIOUREA

See Thiocarbamide.

THORN APPLE

See Stramonium.

THYME CAMPHOR

See Thymol.

THYMIC ACID

See Thymol

THYMOL (Isopropyl-meta-cresol, Thyme Camphor, Thymic Acid, Methylpropylphenol) $(CH_3)_2CHC_6H_3(CH_3)OH$

Colorless crystals.

Properties:

Specific gravity	0.979
Melting point	49°C.
Boiling point	231.8°C.

Solubility:

Soluble in alcohol, chloroform, ether, glacial acetic acid.
Slightly soluble in water and glycerol.

Uses:

An odorizing antiseptic.
Preservative.

Substitutes:

Di-isopropyl metacresol substitutes effectively as an odorizing antiseptic.
As a preservative carvacrol serves as a substitute.

TIFF

See Barium sulfate.

TIL OIL

See Sesame Oil.

TIN

Practically all of the 75000 tons used in this country every year is imported from the Straits Settlement, Bolivia and Nigeria. Since transportation is so tied up with the war effort at this time one can easily realize the difficulties presented. For this reason substitutes must be found and a great number have been suggested.

Article**Babbitt metal****Substitute**

Lead-base babbitt.

A new aluminium alloy which contains 25% nickel.

Bearing metal

Micarta, lead alloys, silicon-bronze alloys, lead-antimony-arsenic - copper - tin alloy.

Bronze

Reclaimed babbitt is used in place of bronze bearings.

Cans

A new fiber can that is impervious to oil. The material for this can is obtained from flaxseed.

Celluplastic (a cellulose acetate plastic). Silver may be applied comparatively cheaply to metal containers by means of electrolytic deposition on the sheet. Lactic acid lacquers may be used as a coating.

Electrolytic tinplate which uses much less tin can be used in place of the hot-dipped tin.

Can for vegetables and fruits

Paper.

Cans for paints, oils, etc.

Tinned body and terne plate bottom and top. Black steel plated container with terne plate tops and bottoms.

Extruded tubing for distilled water lines

Silver-tin alloys.

Moistureproof packing material

Zincfoil.

Collapseable tubes

Tinned lead.

Pewter

Eliminate the use of tin.

Solders

Silver brazing.

Tinless solder, silver-tin alloys.

Silver.

Tinless solder, silver-tin alloys, silver.

In automatic canmaking machines.

Lead-silver alloys.

Metal cement

Terne plate or cadmium in place of tin.

Soft solders

Antimony, cadmium.

Tin plating

Terne plate, organic finishes, indium plating.

Valves, pipe fittings, etc.

Combination of copper, silicon, manganese, lead.

TIN ANHYDRIDE

TIN ANHYDRIDE

See Stannic Oxide.

TIN ASH

See Stannic Oxide.

TIN DIOXIDE

See Stannic Oxide.

TIN PEROXIDE

See Stannic Oxide.

TINCAL

See Borax.

TINKAL

See Borax.

TIOLAN

Trade name for a casein synthetic fiber manufactured in Germany.

TITANIC ACID ANHYDRIDE

See Titanium Dioxide.

TITANIUM DIOXIDE

TITANIC OXIDE

See Titanium Dioxide.

TITANIUM Ti

A very hard, dark gray powder which is amorphous. It stretches steel.

Properties:

Specific gravity4.50

Melting point1795°C.

Solubility:

Soluble in acids.

Insoluble in water.

Uses:

Substitute for manganese in steel making.

In certain cases it may be used as a substitute for vanadium.

TITANIUM DIOXIDE (Titanic Oxide, Titanic Acid Anhydride) TiO_2

A white to black crystalline powder with a soft texture.

Properties:

Melting point1560°C.

Specific gravity3.75-4.25

TOLLAC SOLVENT

Solubility:

Soluble in concentrated sulfuric acid.
Insoluble in water.

Uses:

In ceramic processes as a substitute for borax.

In protective paints as a substitute for red lead.

In place of zinc oxide in powder, rouge and foundation creams.

TOLLAC SOLVENT

Trade name for a hydrocarbon solvent which is water-white in color.

Properties:

Specific gravity .084-0.85 (15°C.)

Aniline point29-30°C.

Uses:

Toluene substitute in the preparation of nitrocellulose lacquers, etc.

TOLUENE (Toluol, Methylbenzene, Phenylmethane) $C_6H_5CH_3$

A colorless inflammable liquid. It resembles benzene in its odor.

Properties:

Specific gravity0.861

Melting point-94.5°C.

Boiling point110.7°C.

TRAGACANTH GUM

Solubility:

Soluble in alcohol, benzene, ether.
Insoluble in water.

Uses:

It is used primarily as a solvent in a great number of industries.

Substitutes:

Very many substitutes have been suggested for this solvent. Practically every one of them is a specially prepared substitute. Examples of these are: Nevsol, Tollac Solvent, Noto1 No. 1, Glusol, Textul, Res-Sol, Leather-sol, etc.

TOLUOL

See Toluene.

TRAGACANTH GUM

A yellowish powder or dull white plates which is obtained as an exudation from *Astragalus gummifer*, native to southwestern Europe and Asia Minor.

Properties:

Specific gravity1.384

Solubility:

Soluble in alkaline solutions, aqueous hydrogen peroxide solutions.

Swells in water.

Insoluble in alcohol.

TRAGACANTHIN

Uses:

Adhesives, leather dressing, calico printing, emulsifying agent.

Substitutes:

Dextrin.

Gomagel.

Sodium alginate.

Solvitex may serve as a substitute for tragacanth in the printing of textile fabrics.

Sterculia gums.

Gum nopal.

TRAGACANTHIN

See Bassorin.

TRAGASOL

See Locust Bean Gum.

TRAIN OIL

See Whale Oil.

TRANSITE

Trade name for a very dense material which is constructed from cement and asbestos.

TRIBUTYL CITRATE

Uses:

Substitute for sheet metal.

Substitute for galvanized corrugated sheet iron.

TRANSPHOTO FILM

See Pliofilm.

TRIACETIN (Glyceryl Triacetate) $C_3H_5(COOCH_3)_3$

A colorless, odorless oil.

Properties:

Specific gravity1.160 (20°C.)

Boiling point276°C.

Solubility:

Soluble in alcohol, ether.

Slightly soluble in water.

Uses:

Substitute for camphor in the manufacture of pyroxylin.

TRIBUTYL CITRATE

A stable, odorless, non-volatile liquid.

Used as a substitute for citric acid as a plasticizing agent.

TRIBUTYL TRICARBALLYLATE

TRIBUTYL TRICARBALLYLATE

Used as a substitute for citric acid as a plasticizing agent.

TRICARBALLYLIC ACID

A substitute for citric acid as a plasticizing agent.

TRICHLORETHYLENE CHClCCl_2

A toxic liquid which is colorless, stable, heavy and low-boiling. It is non-inflammable and possesses an odor similar to that of chloroform. It may be obtained from ethylene by chlorination and fractional distillation.

Properties:

Boiling point86.7°C.

Specific gravity1.4996 (0°C.)

Freezing point-88°C.

Refractive index1.4735 (27°C.)

Solubility:

Soluble in most organic solvents.

Uses:

As a general purpose solvent it may be used in place of carbon tetrachloride.

It may also be used as a reagent in making synthetic dyes, as an ingredient of glues, as a general insecticide, as an ingredient of paint and varnish removers, waterproofing compositions, a refrigera-

TRIETHANOLAMINE

ting medium, ingredient of rubber cements, etc.

TRICHLOROACETIC NITRILE

See Tritex.

TRICHLOROMETHANE

See Chloroform.

TRICHLORONITROMETHANE

See Nitrotrichloromethane.

TRIENOL

Trade name for a castor oil which is said to be chlorinated with hypochlorous acid.

It is used as a substitute for tung oil.

TRIETHANOLAMINE $(\text{HOCH}_2\text{CH}_2)_3\text{N}$

A viscous liquid which is very hygroscopic. It possesses a slight ammoniacal odor.

Properties:

Specific gravity
1.1240-1.1300 (20°C.)

Boiling point244°C.

Flash point355°F.

TRIETHANOLAMINE STEARATE

Solubility:

Soluble in water and alcohol.

Uses:

Saponification and emulsifying agent.

Substitutes:

Trigamine.

Triisopropanolamine.

TRIETHANOLAMINE STEARATE

See Trihydroxyethylamine Stearate.

TRIETHYL CITRATE

A substitute for citric acid as a plasticizing agent.

TRIETHYL TRICARBALLYLATE

A substitute for citric acid as a plasticizing agent.

TRIGAMINE

Trade name for a buffered aliphatic amine which is water-white to pale yellow in color. It is a liquid with a pleasant odor.

TRIGAMINE STEARATE

Properties:

Specific gravity1.17 (25°C.)

pH (10% solution)9.5

Neutralization value208-210

Solubility:

Soluble in water, ethyl alcohol (50%), glycerin, diethylene glycol.

Insoluble in oils and hydrocarbon solvents.

Uses:

In place of borax as a solvent and plasticizer for aqueous casein solutions and shellac.

Substitute for triethanolamine as an emulsifying and saponification agent.

TRIGAMINE STEARATE

Trade name for a cream colored wax.

Properties:

Specific gravity1.050 (25°C.)

Melting point47°C.

Solubility:

Soluble in alcohol, hydrocarbons, oils (hot).

Dispersable (hot) in water.

Uses:

Emulsifying agent to replace triethanolamine stearate.

TRIHIDROXYETHYLAMINE STEARATE**TRIPOLE****TRIHIDROXYETHYLAMINE STEARATE (Triethanolamine Stearate)**

A cream-colored waxy solid.

Properties:

Specific gravity0.968

Solubility:

Soluble in methyl and ethyl alcohols, mineral oil, mineral spirits, vegetable oil.

Disperses in hot water.

Uses:

Emulsifying agent.

Substitutes:

Trigamine stearate.

TRIIISOPROPANOLAMINE

White crystalline solid.

Properties:

Specific gravity1.02 (20°C.)

Melting point45°C.

Boiling point.....188°C.

Flash point305°F.

Solubility:

Soluble in water.

Uses:

Substitute for triethanolamine.

TRIPHENYL PHOSPHATE $\text{PO}(\text{OC}_6\text{H}_5)_3$

A colorless solid. It is odorless and is obtained from phenol and phosphorus oxychloride when they are boiled together in the presence of a small amount of zinc chloride.

Properties:

Melting point48.5°C.

Boiling point245°C.

Specific gravity.....1.268 (60°C.)

Solubility:

Soluble in most solvents.

Uses:

A substitute for camphor in the manufacture of celluloid.

It may also be used as an ingredient of lubricating mixtures, as an ingredient of compositions which are used for the impregnation of roofing paper, an ingredient of airplane dopes, as a plasticizer, etc.

TRIPOLE (Rottenstone)

A porous siliceous rock which is found in nature.

Uses:

An abrasive and filtering medium. It is similar in nature to pumice stone but somewhat softer in texture.

TRIPOLITE

TUNGSTEN W

TRIPOLITE

See Diatomaceous earth.

Iodine number150-165

Refractive index1.5030

Solidifying point2-3°C.

TRITOX

Trade name for a German product which is trichloroacetic nitrile. It is used as a substitute for hydrocyanic acid in the control of insects. It may also be used to replace ethylene oxide. It is claimed to be preferred because of the warning effect caused by irritation of the eyes. This makes it safe for humans.

Uses:

Oleoresinous varnishes and nitrocellulose lacquers.

Paints.

Waterproofing and preserving.

Substitutes:

Castung.

Soft oils with phenol-formaldehyde resins or ester gums and glycerin esters in oleoresinous varnishes.

Special types of linseed oils, combinations of soybean, linseed, oiticica, fish and castor bean oils in paints. Also menhaden and sardine oils.

Dyhydrated castor oil in the preparation of waterproof paints.

Trienol, alkyd resins with low drying oils, specially treated soybean oils, con-julin, doboline oil, Kellin, Kellsoy, Syn-thenol.

It is claimed that an oil extracted from the kukui nut is an excellent substitute for tung oil.

TROLITAX

A German synthetic resin impregnated paper of high dielectric value used in the construction of transformers, electric motors, etc.

TUBATOXIN

See Rotenone.

TUNG OIL (China-wood Oil, Chinese-wood Oil)

A yellow drying oil obtained from the seeds of *Aleurites cordata*. When stored it solidifies.

Properties:

Specific gravity0.9360-0.9432

Saponification value193

TUNGSTEN W

A gray metal which is not heavy but hard and brittle. It is not found in the native state.

TUNO GUM

Properties:

Specific gravity18.77

Melting point3267°C.

Boiling point5830°C.

Solubility:

Soluble in nitric acid, aqua regia and concentrated hot potassium hydroxide.

Insoluble in water.

Uses:

As an alloying metal to prepare tool steel.

Substitutes:

Molybdenum.

TUNO GUM

See Chicle Gum.

TURKELENE

Trade name for a product which is a terpene derivative. It is a dark amber oil.

Properties:

Specific gravity0.920 (25°C.)

Acid value30

Solubility:

Soluble in water, (hot) ethyl alcohol, methyl alcohol, toluene, naphtha.

Slightly soluble in mineral oil and cottonseed oil.

Uses:

Substitute for sulfonated oils as an emulsifier.

TURKEY GALLS

See Galls.

TURKEY RED OIL (Sulfonated Castor Oil)

This oil is obtained when castor oil is sulfonated with sulfuric acid.

Properties:

Specific gravity0.95

Saponification value189-193

Iodine value82.1

Solubility:

Soluble in water.

Uses:

Textile dyeing.

In the manufacture of coated paper.

Substitutes:

Acid soaps.

Sol lustre.

Sulfonated soy bean oil.

Sulfonated tall oil may serve as a substitute for sulfonated castor oil in the manufacture of coated paper.

Whitcol oleine oil.

Uses:

Solvents, paints, varnishes, lacquers.

Substitutes:

Decalin.

Tetralin.

TURPENTINE

When the products of the pine tree are distilled a colorless and volatile liquid is obtained. This liquid is turpentine. It is a complex mixture of terpene hydrocarbons.

Turpentine is used mainly by the paint and varnish industry. It is also used in the manufacture of shatter-proof glass, in synthetic camphor and insecticides.

Pinene III a trade named product may be used interchangeably with turpentine. Because of its greater volatility Pinene III may be preferred in certain cases.

Polishing oil is also used as a substitute for turpentine.

Tetrahydronaphthalene is another substitute for turpentine.

Dipentene and mineral spirits substitute effectively for turpentine.

Varro spirits.

TURPENTINE OIL (Spirits of Turpentine, Turps)

An oil obtained when turpentine is distilled with water or steam.

TURPENTINE SUBSTITUTES

A special fraction of petroleum oils intermediate between gasoline and illuminating oil.

Properties:

Boiling range130-160°

Specific gravity0.74-0.77

Uses:

To replace turpentine as a paint thinner.

TURPS

See Turpentine Oil.

TYGON

Trade name for a series of vinyl chloride products. They resemble rubber in many of their properties. These products are available in forms ranging from bone hard substances to soft jellies.

Although they resemble rubber in their physical characteristics, chemically they are entirely different.

TYGON

TY-TYTE

They are claimed to be unusually stable. Formulations may be compounded which will be resistant to virtually all corrosive substances. They are unaffected by oils or water. They are completely immune to the oxidizing effect of air and sunlight. The abrasion resistance is good.

Uses:

To combat destructive corrosion.

Protective linings for tanks and pipes, gaskets, fabric impregnation, shatter-resistant glass coatings, tubing, etc.

TYLOSE

Trade name for a methyl cellulose adhesive.

TY-TYTE

Trade name for a product manufactured to save rubber bands in binding bundles of letters, cards, etc. It consists of a piece of tough paper with a riveted paper button and 26 inches of stout cord.

U.

UREA (Carbamide) $\text{CO}(\text{NH}_2)_2$

White crystalline substance.

Properties:

Specific gravity1.335

Melting point132°C.

Solubility:

Soluble in water, alcohol, benzene.

Slightly soluble in ether.

Uses:

To inhibit the splitting and checking of lumber during the seasoning or drying process.

In the treatment of wood so that it may be bent or shaped for certain purposes.

In conjunction with iron salts urea may be used for tanning purposes. In Germany it has been found that much natural extracts and chrome salts may be preserved by tanning leather with such materials.

It has been found that urea may be substituted for acetamide as a stabilizer for hydrogen peroxide solutions.

Urea is also used to stabilize explosives, celluloids, etc., and as a fertilizer.

Substitutes:

Sulfamic acid in the dye and pigment industries.

UREA-FORMALDEHYDE RESINS

A great number of molding compositions are made by the condensation of urea and formaldehyde. The products obtained from these compositions are available in a wide variety of colors which are of good stability and shade.

Examples of urea-formaldehyde condensation products are Unyte, Plaskon, and Beetle.

Uses:

Applied to cloth to make it crease-proof. It is also used in nitro-cellulose lacquers. These products may be used as decorative items, closures, buttons, kitchen ware, etc.

UROTROPIN

See Hexamine.

USF-RUBBER

Trade name for a new and purer form of natural rubber. It has been designed to satisfy the demands expressed by consumers of the crude rubber. It is claimed to have a greater uniformity for easier processing. It is soft, requiring less power in milling. It also possesses greater resistance to flex-cracking, good color and it has a cleanliness and purity of a high order.

V

VAN DYKE BROWN

A mixture of iron oxide and some organic matter which is obtained from peat deposits, bog-earth or ochers which contain bituminous matter. Its composition is indefinite.

Uses:

In the manufacture of pigments.

VANADIUM

A light gray metal which is crystalline.

Properties:

Specific gravity6.025

Melting point1730°C. (approx.)

Solubility:

Soluble in mineral acids.

Insoluble in water.

Uses:

In recent years vanadium compounds have been used to a great extent to replace more expensive catalysts in the manufacture of sulfuric acid and a number of other chemical products.

Ammonium meta vanadate is the usual raw material in the preparation of these catalysts.

Vanadium is also used in the manufacture of high speed steel. Its other uses are being filled by low grade aluminum, zirconium, titanium and boron. Manganese-vanadium steel may be replaced by other steels which do not use vanadium. It has been suggested that titanium can act as a substitute for vanadium in certain cases.

VANALDOL

Trade name for a specially prepared ethyl vanillin.

It is claimed that this product is three and a half times stronger than vanillin.

VANILLIC ALDEHYDE

See Vanillin.

VANILLIN (Methylprotocatechuic Aldehyde, Vanillic Aldehyde) CHOOCH_3OH

White crystals with a vanilla taste and pleasant odor.

Properties:

Melting point81-82°C.

Boiling point285°C.

VARNO SPIRITS

VICAR

Solubility:

Soluble in water, alcohol, ether, chloroform, glycerol.

Uses:

Perfumes, flavoring.

Substitutes:

Vanaldol.

VARNO SPIRITS

Trade name for a product which is used in the manufacture of paints and varnishes.

Properties:

Specific gravity0.7892

Flash point106°F.

Aniline point55.5°C.

Uses:

It is claimed to be a substitute for turpentine in thinning paints and varnishes.

VEGETABLE GUM

See Dextrin.

VEGETABLE PEPSIN

See Papain.

VEGETABLE PARCHMENT

A product obtained when unsized paper is immersed in sulfuric acid for a short time. It is then washed and dried immediately. The resulting product is tough and looks like natural parchment.

A similar product is obtained when sulfite pulp is beaten into a slimy mass and then formed into sheets.

Uses:

Substitute for natural parchment.

VEGETABLE WAX OF JAPAN

See Japan Wax.

VERBENA OIL

See Lemongrass Oil.

VERNONITE

Trade name for a methyl methacrylate resin which is used for dentures and dental devices.

VICAR

Trade name for a 96% silica glass which can be used at temperatures of 800-1000°C. It is claimed to have the outstanding corrosion resistance ordinarily associated with silica. It can be produced in all shapes, sizes and intricacy.

VINEGAR ACID

VINEGAR ACID

See Acetic acid.

VINOFLEX

Trade name for a German substitute for chlorinated rubber. It is said to show high resistance to alkalis and acids. It is used as a coating on light metals which are usually hard to protect. Various Vinoflex products are also said to improve tars and resins when incorporated in the formulation.

VINSOL

Trade name for a pine resin powder which is an addition to the family of resin-treated laminated paper products. It is a thermoplastic, fibrous-resin composition which is hard, dense and stiff. It is said to be reasonably tough. It is highly resistant to petroleum products.

Uses:

A possible substitute for steel or other scarce metals in containers for food shipments. It may also be used for automobile license plates, in trucks, street cars and buses, conduits, electrical insulation, phonograph records, paper boards, matches, mineral wool, adhesives, etc.

VINYL BENZENE

See Styrene.

VINYLLITE

VINYL RESINS

Vinyl resins are obtained by the copolymerization of vinyl chloride and vinyl acetate. The proportions of each constituent may be varied according to the characteristics of the product desired. A resin high in vinyl acetate is tough and flexible. They are usually utilized for coating materials. When treated with aldehydes these resins become harder than they usually are. It has been suggested that vinyl coated cardboard and paper containers could be used to replace tin and aluminum for certain purposes.

Examples of these resins are:

Alvars—used in the spirit varnishes, enamels, lacquers, cements, adhesives, etc.

Vinylite—a vinyl chloride-vinyl acetate resin which is finding use in the manufacture of flexible sound records, artificial dentrifices, coatings and spirit varnishes.

VINYLLACETO-B-LACTONE

See Diketene.

VINYLLITE

Trade name for a series of synthetic thermoplastic resins which are plasticized vinyl chloride and vinyl acetate polymers. It is a rubbery like material available in four types:

Series A. Polymerized vinyl acetate.

A granular white powder, slow-burning, heat and light stable. These resins are resistant to weak acids, alkaline and salt solutions.

VINYLLITE

Properties:

Specific gravity1.91 (20°C.)

Tensile strength
5000 lbs. per sq. in.

Refractive index1.4665

Solubility:

Stable in most alcohols, ketones, esters.

Insoluble in petroleum naphthas, turpentine, glycol, water.

Uses:

Adhesive for cloth, wood, leather, paper, cardboard.

Binding agent for artificial wood.

Series Q. Polymerized vinyl chloride.

A white powder. It does not support combustion. It is resistant to concentrated acids, alkalis, alcohols.

Properties:

Specific gravity1.406

Refractive index1.544

Solubility:

Soluble in dioxanes, ethylene dichloride.

Slightly soluble in acetone.

Insoluble in water, alcohols and acids.

Uses:

A resilient rubber.

Impregnating fabric for wire insulation.

Gaskets and washers.

It is claimed that this product is superior to rubber in its resistance to sunlight, water, acids, and other corrosive chemicals. It is also said to be superior to rubber in its flexing life.

Series V. Copolymerized vinyl chloride and vinyl acetate.

A white powder which is tasteless and odorless. It is said that these products can be plasticized to any degree of flexibility, that they are highly impact resistant and only slightly affected by corrosive chemicals.

Properties:

Specific gravity1.34-1.36

Tensile strength
8000-10000 lbs. per sq. in.

Solubility:

Soluble in chlorinated hydrocarbons, dioxane, propylene oxide and mesityl-oxide.

Uses:

Toothbrushes and handles, transcription records for radio broadcasts, containers, bottlecaps, linings for food cartons, pipe lines, conveying equipment, etc.

Series X. Polyvinyl Butyral.

A white granular powder which is heat stable and resistant to sunlight and ultraviolet rays. It is claimed to be very tough and that it retains most of its tensile strength up to its elastic limit.

Properties:

Specific gravity1.11

Tensile strength
8100-8500 lbs. per sq. in.

VINYLSEAL

Solubility:

Soluble in methyl and ethyl alcohols.

Insoluble in water and aliphatic hydrocarbons.

Swells in ketones, chlorinated and aromatic hydrocarbons.

Uses:

Interlayer for safety glass.

Adhesive and leather-finishing base.

VINYLSEAL

Trade name for an adhesive which is an acetone solution of a vinylite resin.

It is used for bonding metals, paper, cloth, leather and rubber.

VINYON

Trade name for a special grade of copolymerized vinyl resin consisting of vinyl chloride and vinyl acetate in the form of a staple fiber or a continuous filament yarn. It is a thermoplastic resin which is claimed to possess all the characteristics of vinylite resin such as being chemically inert, non-flammable, water-resistant and mildew proof. It is a non-conductor of electricity.

Properties:

Specific gravity1.34-1.36

Solubility:

Soluble in chlorinated hydrocarbons, dioxane, propylene oxide, mesityl oxide.

VISTANEX POLYBUTENE

Softens in aldehydes, ethers, esters, carbon disulfide and aromatic hydrocarbons.

Uses:

Filter cloths, pressed felts, threads, tents, awning material, raincoats, umbrella fabrics, hosiery, in laundries and paper mills against the action of hydrochlorite solutions, insulation purposes, fish nets and lines, shower curtains, bathing suits, etc.

VIRGIN DROP BLACK

See Boneblack.

VISTANEX POLYBUTENE

Trade name for a synthetic rubber which is said to be a polymer of isobutylene. Because of its saturated condition it cannot be vulcanized. It is a rubbery material which is odorless, colorless and chemically inert. When stretched it exhibits an x-ray pattern similar to that of rubber.

Properties:

Specific gravity0.90 (approx.)

Solubility:

Soluble in toluene, turpentine, chlorinated solvents.

Insoluble in alcohols, esters, ketones, vegetable oils, oxygen containing solvents.

If heated above 250°F. for an extended period it softens and depolymerizes. It

VISTRALAN FIBER

decomposes at very high temperatures. Exposure to sunlight does not appreciably affect it. The same is true on exposure to air. On prolonged exposure to sunlight however it does tend to soften.

Uses:

Vistanex Polybutene imparts a plasticizing action to most mixtures.

When used in wax and asphalt mixtures adhesion and flexibility are improved. When mixed with rubber in cements and similar articles the aging properties are improved and permeability to gases and moisture is lessened.

When substituted for part of the rubber in a compound it improves the resistance to vegetable oils and fats.

VISTRALAN FIBER

A synthetic fiber made in Germany. It is said to be similar to the British Rayolanda WD.

VITREOUS ENAMEL

These are fused silicate coatings which are applied to metals. The metals most commonly used are steel or cast iron.

This type of enamel can be of great use in signs, stoves, refrigerators, and dairy, canning and chemical equipment.

VUE

Trade name for a glass block which was developed for the special needs where outside vision is desired through panels of glass blocks which are not transparent.

It is claimed that this new block permits sufficient general vision of large objects beyond the panel, although the visibility of sharp details is not possible under most conditions.

Three glass blocks combine the high insulation properties of the usual glass block.

VX BLEND

Trade name for a mixture of propane and some undisclosed ingredients. It is claimed that it may be used as a substitute for butane in the bottled gas systems of homes and factories.

VYCOR

Trade name for a low expansion boro silicate glass of special composition. It consists of 96% silicate and is highly resistant to thermal shock.

Linear coefficient of expansion is 0.0000008 per °C. between 19-350°C.

W

WELLIT

Trade name for a product developed in Sweden in which paper is used to replace cork as an insulating material. It is claimed that this product is cheaper than cork and almost as satisfactory for insulating purposes in dwellings and refrigerators. It is constructed of slabs of special kraft paper impregnated to make it impervious to moisture.

WHALE OIL (Train Oil, Sperm Oil, Body Oil, Blubber Oil)

A yellowish-brown natural liquid. It is non-drying with a strong fishy odor.

Properties:

Specific gravity0.925-0.930

Melting point14-27°C.

Saponification value188-193

Iodine value120

Solubility:

Soluble in alcohol, benzene, ether, chloroform, carbon bisulfide.

Uses:

Leather dressing.

Substitutes:

Nopco 2091 X.

Tanoyl 1269.

WHITCOL OLEINE OIL

Trade name for a Turkey red oil substitute. It may be used in the production of textile finishes.

WHITE BOLE

See Kaolin.

WHITE COPPERAS

See Zinc Sulfate.

WHITE LEAD

A pigment extensively used in the paint industry. It is a white amorphous powder.

Solubility:

Soluble in acids.

Insoluble in water.

WHITE MICA

Uses:

Paint pigment, putty, ceramic glazes.

Substitute for red lead in protective paints.

Substitutes:

Oil white.

WHITE MICA

See Muscovite.

WHITE MINERAL OIL

See Petrolatum, Liquid.

WHITE VITRIOL

See Zinc Sulfate.

WHITE WAX

See Beeswax.

WHITING (Paris White, Gilder's Whit- ing)

A form of calcium carbonate which is ground, levigated and dried. It is white amorphous powder.

The physical properties vary according to the source, the process of manufacture and the care used in the production of the material.

WOOD

Uses:

It is used as a substitute for feldspar in ceramic glazes.

It is also used in the manufacture of rubber.

Substitutes:

In England it has been found that anhydrous calcium sulfate is an excellent substitute for whiting.

WILKINITE

See Bentonite.

WINESTONES OIL

See Grape-seed Oil.

WIRE GLASS

A new type of structural glass obtained by laying a steel wire netting into soft glass between two rolls immediately after the glass has been fed from the furnace.

WOOD

Wood is rapidly regaining its place as a constructional material. In a great many cases it is being used as a substitute for critical materials such as metals, alloys and composition materials.

In many newly constructed plants and factories wood is being used in place of

WOOD

steel. Big timbers made into beams are solving the problem of steel shortages. These beams can be protected from decay and insects by a newly perfected salt impregnation method in which zinc chloride or some other salt is used.

A great many products formerly manufactured from metal are now being made from wood. Among these may be listed the following:

Airplane propellers.

Containers for shipping explosives.

Fluorescent lighting fixtures.

Rolling doors on piers, warehouses, freight platforms, garages, etc.

Chair and carriage springs.

Bottle tops.

A revolutionary advance involves a new plasticizing process as a result of which wood may be twisted like rope, bent like lead and molded like dough. This process imparts a hardness equivalent to some types of steel. Urea is used in the treatment.

A new product is obtained when a series of thin layers of wood are bound together, impregnated with a chemical and compressed to half or a third its original size. The product which is finally obtained is claimed to be nearly as hard and smooth as glass and it approaches steel in strength. This wood product can be molded and sawed.

It has recently been announced that railway boxcars can be made of 5-ply British Columbia fir, five-eighths of an inch in thickness. This reduces the net weight of each car by approximately 1800 pounds and because of this allows the transportation of more freight per train.

Because of the shortage of cotton liners with which to prepare the nitro-

cellulose base of smokeless powders a new process utilizing wood pulp has been developed.

Wood can be used in place of gasoline in automobiles if a wood burning unit is installed. In Europe such generators have been in use on trucks, buses and tractors.

The bark of the red wood tree has been found capable of being woven in such a manner as to produce a thread. When this thread is combined with wool a fabric is obtained which possesses the properties of wool.

Wooden tire wheels have been introduced for use on tractor drawn trailers in one shipyard. Blocks of hard maple soaked in linseed oil are used. It has been reported that these wheels are an excellent substitute for rubber. They stand up under a load of 50 tons.

Many farm implements have parts which are being made of wood where steel was formerly used. It is claimed that plywood and mineral boards in sheet form will give service comparable to that given by sheet metal or solid lumber. This is especially true in cases of coverage.

Plywood is very resistant to moisture. However the present demand for this material is so great that only limited amounts are available for ordinary civilian use. For some uses the qualities of plywood are superior to those of solid wood. It swells and shrinks less than does solid wood on exposure to humidity changes. It is resistant to checking.

Several kinds of fiberboard may be considered as substitute for plywood. Some are hard and stiff and may be used for wall coverage. Another type is made from minerals or minerals combined with wood or other fibers. These are fire-resistant.

Steel in the manufacture of articles such as advertising signs other than billboards,

WOOD ALCOHOL

building arches, automobile license plates, barges, barrels, temporary buildings, cabins, cable and wire reels, pressed ceilings, clothes hampers and hangers, concrete forms, fence posts, display racks, curtain poles, fire doors, window and door frames, furniture, etc., is rapidly being replaced by wood.

Tin is another critical metal being replaced by wood. It has been found that articles such as bearings (babbitt metal), boxes and cans, and tinned buttons can be manufactured from wood just as well as from tin.

WOOD ALCOHOL

See Methyl Alcohol.

WOOD FLOUR

Finely pulverized wood. The flour is obtained when the wood is ground very finely in mills and then screened.

It may be used in place of cellulose as an absorbent in various industries.

WOOD NAPHTHA

See Methyl Alcohol.

WOOL GREASE

WOOD SPIRIT

See Methyl Alcohol.

WOOL

Much of the wool used in this country is imported from Australia and South America. With the current shortage of shipping space it is obvious that a shortage will soon exist. It is natural that substitutes will then be sought.

Soybean is a potent source of substitutes. The protein extracted from the bean is used at the present time for the preparation of a wool-like material. It resembles wool. It has been found that the finished product is white to light tan in color with a medium luster. It has a warm, soft feel with a natural crimp and a high degree of resiliency. It is said to be highly resistant to carbonizing and to boiling in dilute acids and alkalies.

Casein wool is similar to sheeps wool in its chemical constitution.

It has been reported that fibers obtained from the redwood bark can be mixed with wool for weaving into cloth.

WOOL GREASE

See Degras.

X

Y

XANTHORRHEA GUM

See Acaroid.

YACCA GUM

See Acaroid.

YEAST (Barm)

A viscous liquid or a soft mass which is yellowish-white in color. It is a ferment obtained in brewing and consists of the cells and spores of *Saccharomyces cerevisiae*.

It is used in baking.

Substitutes:

Ammonium bicarbonate.

Potassium bicarbonate.

YUCCA

A fibrous bladed plant which grows in the United States. It has been suggested that it may serve as a substitute for manila hemp, jute and similar imported vegetable fibers.

It has been reported that rope, twine, burlap and upholstering material can be manufactured from yucca. This rope can be used for all purposes except marine use.

The sap extracted from yucca can be used as a by-product for the manufacture of soap.

YUMIDOL

Trade name for a special grade of sorbitol syrup. It is a water-white viscous liquid with a pleasant odor.

Properties:

Specific gravity1.35 (25°C.)

pH6.4

Solubility:

Soluble in water, ethyl alcohol, methyl alcohol, glycerin, diethylene glycol.

Uses:

Substitute for glycerin as a humectant.

Z

ZAPOTA GUM

See Chicle Gum.

ZEIN

An odorless, tasteless, non-toxic protein which is obtained from corn. In solution it is relatively unstable but when in the dry state it is very stable towards heat. It also tends to become denatured in solution.

Properties:

Specific gravity1.226

Solubility:

Soluble in dilute alcohol.

Insoluble in water, dilute acids, anhydrous alcohols, turpentine, esters, oils and fats.

Uses:

It is a raw material for plastics of the casein type. These plastics are easily machined, they can be dyed from aqueous dye baths after all forming operations have been completed. They are very tough and their water resistance is somewhat better than that of casein plastics.

These plastics may be used as decorative coatings for magazine covers, labels, etc. The surface obtained is pleasing without the high gloss characteristic of

some other coating materials. It can, however, be formulated with a high gloss.

It may also be used as a food wrapper because of its resistance to grease and oil.

ZELAN

Trade name for a product which is a complex organic compound. When compounded with textile fibers a finish is obtained that is water-repellent and very stable.

Uses:

Textile water-repellent agent.

ZINC (Blue Powder)

A metal not found in the native state. It is shiny, white with a bluish-gray lustre.

Properties:

Specific gravity7.142

Melting point419°C.

Boiling point918°C.

Solubility:

Soluble in acids and alkalis.

Insoluble in water.

ZINC ACETATE

Uses:

In toxicological analyses.

In dry batteries.

In alloys, lithographing plates, hardware, oven vents, base die castings.

As a corrosion-resisting coating for iron.

Substitutes:

Magnesium is a substitute for zinc in toxicological analyses and in dry batteries. Plastic materials may replace zinc in alloys and in die cast models of the control unit for automatic record players. Processed paper and plastics can replace zinc in lithographing plates.

Japanned and plain steel may replace zinc in coated hardware. Steel vents and a baked japan finish may be used in place of zinc in oven vents.

Steel, cast iron and malleable iron may be used as base dies castings to replace zinc.

As a corrosion resisting coating for iron any of the following may be used in place of zinc:

Air drying japan.

Roxoprene.

Polyvinyl chloride.

Koroplate.

ZINC ACETATE

White crystals with a pearly luster.

Properties:

Specific gravity1.72

Melting point235°C.

ZINC OLEATE

Solubility:

Soluble in water and alcohol.

Uses:

Substitute for tartar emetic in dyeing with basic dyes.

ZINC ALLOY MOLDS

It has been suggested that zinc alloy molds may be used instead of hardened steel in the production of plastics.

The advantages offered by the use of zinc mold are several. In the first place the cost of machining is reduced. The mold may be remelted and reused indefinitely. Furthermore the time required to develop a polished surface is considerably reduced.

These molds may be used for a limited production only.

ZINC OLEATE

A white, granular powder which is greasy to the feel. It is obtained as a product of the reaction between zinc acetate and sodium oleate.

Solubility:

Soluble in alcohol, ether, benzene and carbon bisulfide.

Insoluble in water.

Uses:

A substitute for aluminum oleate as a paint drier.

ZINC OXIDE

ZINC OXIDE (Chinese White, Zinc White, Flowers of Zinc) ZnO

An amorphous white powder.

Properties:

Specific gravity5.78

Solubility:

Soluble in acids.

Insoluble in alcohol and water.

Uses:

Filler for rubber. Also used for powder, rouge and foundation creams.

Substitutes:

Silene.

Titanium dioxide may be used in place of zinc oxide in powder, rouge and foundation creams.

Ursolic acid may be used instead of zinc oxide in cosmetics.

If barium sulfate is purified so that it contains no soluble barium salts it may substitute for zinc oxide in toilet preparations.

A mixture of 6.25 parts of zinc oxide, 94 parts of clay and 33 parts of blanche fixe (per 100 parts of rubber) may be used in place of zinc oxide as a rubber filler. This mixture has been found to give satisfactory results in Great Britain. It may also be replaced by a precipitated silica treated with a magnesium salt.

ZINC SULFATE

ZINC STEARATE

A white powder obtained as a product of the action of sodium stearate on zinc sulfate.

Solubility:

Soluble in acids.

Insoluble in water, alcohol and ether.

Uses:

As a substitute for aluminum oleate as a drier for paints.

ZINC SULFATE (White Vitriol; White Copperas; Zinc Vitriol) $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$

Colorless crystals which effloresce in air.

Properties:

Melting point50°C.

Specific gravity1.9661

Molecular weight287.56

Solubility:

Soluble in water; insoluble in alcohol.

Uses:

As a clarifier it may be substituted for activated carbon.

ZINC TETROXYCHROMATE**ZOLA****ZINC TETROXYCHROMATE $4Zn(OH)_2 \cdot ZnCrO_4$**

A yellow pigment which is comparatively new. It has limited solubility in water.

Properties:

Specific gravity4.0

Uses:

Substitute for red lead in rust preventing primers.

ZINC VITRIOL

See Zinc Sulfate.

ZINC WHITE

See Zinc Oxide.

ZIRCONIA

See Zirconium Oxide.

ZIRCONIC ANHYDRIDE

See Zirconium Oxide.

ZIRCONIUM OXIDE (Zirconia, Zirconic Anhydride) ZrO_2

Heavy, white amorphous powder.

Properties:

Specific gravity5.0

Melting point2500°C.

Solubility:

Soluble in nitric acid.

Insoluble in water, sulfuric acid and hydrochloric acid.

Uses:

Substitute for calcium oxide in calcium lights.

Substitute for stannic oxide in enamels and glass.

ZOLA

See Borax.

I N D E X
OF
TRADE NAMES

A

Abalyn	Hercules Powder Co., Wilmington, Del.
Abopon	Glyco Products Co., Brooklyn, N. Y.
Accotex	Armstrong Cork Co., Lancaster, Pa.
Aceto Butyrate Tubing	Julius Blum & Co., N. Y. C.
Acralite	Acralite Co., N. Y. C.
Acrawax	Glyco Products Co., Brooklyn, N. Y.
Acrolite	Continental Diamond Fiber Co., Newark, Del.
Acryloid Resins	Resinous Products & Chem. Co., Phila., Pa.
Adheso Wax	Glyco Products Co., Brooklyn, N. Y.
Advagum	Advance Solvents & Chem. Co., N. Y. C.
Aerotex Resins	American Cyanamid Co., Calco Div. Bound Brook, N. J.
Agripol	Reichhold Chem. Co., Detroit, Mich.
Albacer	Glyco Products Co., Brooklyn, N. Y.
Albertol Resins	Rohm & Haas, Phila., Pa.
Albusol	Mallinckrodt Chem. Works, St. Louis, Mo.
Alpha Protein	Glidden Co., Cleveland, Ohio.
Alundum	Norton Co., Worcester, Mass.
Alvar	Shawinigin Chemicals, N. Y. C.
Amberlac	Resinous Products & Chem. Co., Phila., Pa.
Amberlite	Resinous Products & Chem. Co., Phila., Pa.
Amberol	Resinous Products & Chem. Co., Phila., Pa.
Ambrac	American Brass Co., Waterbury, Conn.
Ambrox	Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Ameripol	B. F. Goodrich Co., Akron, Ohio.

AmeroidAmerican Plastics Corp., N. Y. C.
Ammonium Stearate SGlyco Products Co., Brooklyn, N. Y.
Ammonium SulfamateDu Pont, Wilmington, Del.
Anhydrex AA-60Simplex Wire and Cable Co., Boston, Mass.
Ansol MU. S. Industrial Chemicals, N. Y. C.
ApcoAnderson-Prichard Oil Co., Oklahoma City, Okla.
Aqualized PaperBrown Co., N. Y. C.
AquaplexResinous Products and Chem. Co., Phila., Pa.
AquaresinGlyco Products Co., Brooklyn, N. Y.
AralacAralac Inc., N. Y. C.
ArasanDu Pont, Wilmington, Del.
Aratone 270Atlantic Research Assoc., Boston, Mass.
Armstrong's No. 841Armstrong Cork Co., Lancaster, Pa.
ArochemStrook & Wittenberg Corp., N. Y. C.
ArochlorMonsanto Chem. Co., St. Louis, Mo.
AroplazStrook & Wittenberg, Corp., N. Y. C.
Asphalt TileArmstrong Cork Co., Lancaster, Pa.
AstrotoneDu Pont, Wilmington, Del.
AstrulanAmerican Cyanamid and Chem. Co., N. Y. C.
Astrulan DAmerican Cyanamid and Chem. Co., N. Y. C.
AtabrineWinthrop Chem. Co., N. Y. C.
Avitone ADu Pont, Wilmington, Del.

B

BakeliteBakelite Corp., N. Y. C.
BanrocJohns-Manville, N. Y. C.
BarretanBarrett Co., N. Y. C.
BeckaciteReichhold Chemicals, St. Louis, Mo.
BeckamineReichhold Chemicals, St. Louis, Mo.
BeckolinReichhold Chemicals, St. Louis, Mo.
BeckopolReichhold Chemicals, St. Louis, Mo.
BeckosolReichhold Chemicals, St. Louis, Mo.
Beetle ResinsAmerican Cyanamid and Chem. Co., N. Y. C.

BenaliteMasonite Corp., Chicago, Ill.
BubblfilDu Pont, Wilmington, Del.
ButaciteDu Pont, Wilmington, Del.
Butyl RubberStanco Distributing Co., N. Y. C.
B.Z. Wax AGlyco Products Co., Brooklyn, N. Y.

C

Carbic Anhydride ResinCarbide and Carbon Chem. Co., N. Y. C.
Carbitol LaurateCarbide and Carbon Chem. Co., N. Y. C.
Carbitol StearateCarbide and Carbon Chem. Co., N. Y. C.
CarbosolCarbogen Chem. Co., Garwood, N. J.
Casco ResinsCasein Co. of America, N. Y. C.
CatalinAmerican Catalin Corp., N. Y. C.
CelastecDu Pont, Wilmington, Del.
CellophaneDu Pont, Wilmington, Del.
Cellosolve SolventsCarbide and Carbon Chem. Co., N. Y. C.
Cell-U-BlanketMasonite Corp., Chicago, Ill.
CellulfoamMasonite Corp., Chicago, Ill.
CelluloidCelluloid Corp., N. Y. C.
CerafluxGlyco Products Co., Brooklyn, N. Y.
ChemigumGoodyear Tire and Rubber Co., Akron, Ohio
ChlorcosaneMonsanto Chem. Co., St. Louis, Mo.
Chlorinated DiphenylMonsanto Chem. Co., St. Louis, Mo.
ChromitronAmerican Cyanamid and Chem. Co., N. Y. C.
Cinelin FlakesCinelin Co., Indianapolis, Ind.
ClariteNeville Co., Pittsburg, Pa.
CMCanadian Industries, Lmt., Montreal, Can.
CondensiteBakelite Corp., N. Y. C.
CorduraDu Pont, Wilmington, Del.
Co-Ro-LiteColumbian Rope Co.
CorpolinAktivan Corp., N. Y. C.
Corrosol No. 26International Rustproof Co., Cleveland, Ohio
Corrugated Asphalt SidingCelotex Corp., Chicago, Ill.

Coumarone-Indene ResinsBarrett Co., N. Y. C.
CrystaliteRohm and Haas, Phila., Pa.
CrystolexRohm and Haas, Phila., Pa.
CumarBarrett Co., N. Y. C.

D

Diglycol Laurate SGlyco Products Co., Brooklyn, N. Y.
Digylcol Stearate SGlyco Products Co., Brooklyn, N. Y.
Dill-Car SeedR. J. Spitz, N. Y. C.
DrieriteW. A. Hammond Drierite Co., Yellow Springs, Ohio
Dry IcePure Carbonic, Inc., N. Y. C.
DuponolDu Pont, Wilmington, Del.
DuratileDurabilt Wall Products, Toronto, Can.
DurezGeneral Plastics, Inc., No. Towawanda, N. Y.
DurironDuriron Co., Inc., Dayton, Ohio
DuriteR. T. Vanderbilt Co., N. Y. C.

E

Eastman Acetate SheettingEastman Kodak Co., Rochester, N. Y.
EthocelDow Chemical Co., Midland, Mich.
Extendex CWishnick-Tumper, Inc., N. Y. C.
ExtonDu Pont, Wilmington, Del.

F

FabrikoidDu Pont, Wilmington, Del.
FacticeStamford Rubber Supply Co., Stamford, Conn.
FalkoteFalk and Co., Pittsburgh, Pa.
FalkoverFalk and Co., Pittsburgh, Pa.
FalkydFalk and Co., Pittsburgh, Pa.
FeculoseTater Machinery Co., Leominster, Mass.
FedraliteFederal Elec. Co., Chicago, Ill.
Fel-Pro Thiokol StripFelt Products Mfg. Co., Chicago, Ill.
FelsealFelt Products Mfg. Co., Chicago, Ill.

Fiberglas	Owens-Corning Fiberglas Co., Pittsburgh, Pa.
Fibro	Viscose Co., N. Y. C.
Flamenol	General Electric Co., Schenectady, N. Y.
Flexalyn	Hercules Powder Co., Wilmington, Del.
Flexo Wax C	Glyco Products Co., Brooklyn, N. Y.
Flexoresin	Glyco Products Co., Brooklyn, N. Y.
Flexseal	Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Florex	Floridin Co., Warren Pa.
Floridin	Floridin Co., Warren Pa.
Fluorex	American Fluoride Co., N. Y. C.
Foamapin Liquid	Glyco Products Co., Brooklyn, N. Y.
Foamglas	Pittsburgh-Corning Glass Corp., Pittsburgh, Pa.
Formex	General Electric Co., Schenectady, N. Y.
Formvar	Shawinigin Products Corp., N. Y. C.
Fortisan	Celanese Corp., N. Y. C.

G

G. B. S. Soda	Du Pont, Wilmington, Del.
Galalith	American Plastics Co., N. Y. C.
Gelowax	Glyco Products Co., Brooklyn, N. Y.
Gelva Resins	Shawinigin Products Corp., N. Y. C.
Glaurin	Glyco Products Co., Brooklyn, N. Y.
Glucarine B	Glyco Products Co., Brooklyn, N. Y.
Glyceryl Monoricinoleate S	Glyco Products Co., Brooklyn, N. Y.
Glyceryl Phthalate S	Glyco Products Co., Brooklyn, N. Y.
Glyptal	General Electric Co., Schenectady, N. Y.
Gomagel	Glyco Products Co., Brooklyn, N. Y.
Grainal	Vanadium Corp. of America, N. Y. C.
Guai-a-phene	Glidden Corp., Cleveland, Ohio
Gunk	Curran Corp., Malden, Mass.

H

Halowax	Halowax Corp., N. Y. C.
Hercose C	Hercules Powder Corp., Wilmington, Del.
Hercosol No. 80	Hercules Powder Corp., Wilmington, Del.
Hycar	Hydrocarbon Chem. and Rubber Co., Akron, Ohio
Hydron	U. S. Rubber Co., N. Y. C.
Hydroresin A	Glyco Products Co., Brooklyn, N. Y.

I

Inceloid	American Products Mfg. Co., New Orleans, La.
Indalone	U. S. Industrial Chem. Co., N. Y. C.
Indusoil	W. Va. Pulp and Paper Co., N. Y. C.
Iwnal	Synbar Corp., Wilmington, Del.

K

Karropak	Felt Products Mfg. Co., Chicago, Ill.
Kennametal	McKenna Metal Co., N. Y. C.
Korogel	B. F. Goodrich Co., Akron, Ohio
Korolac	B. F. Goodrich Co., Akron, Ohio
Koroplate	B. F. Goodrich Co., Akron, Ohio
Koroseal	B. F. Goodrich Co., Akron, Ohio

L

Lethane	Rohm and Haas Co., Phila., Pa.
Leukonin	Harshaw Chem. Co., Cleveland, Ohio
Lignoflex	Felt Products Mfg. Co., Chicago, Ill.
Ligno-Neoprene	Felt Products Mfg. Co., Chicago, Ill.
Liqro	W. Va. Pulp and Paper Co., N. Y. C.
Lithcote	Lithgow Corp., Chicago, Ill.
Lucite	Du Pont, Wilmington, Del.
Lumapane	Celanese Corp., N. Y. C.
Lumarith	Celanese Corp., N. Y. C.
Lustron	Monsanto Chemicals Co., St. Louis, Mo.

M

Makalot	Makalot Corp., Boston, Mass.
Masonite	Masonite Corp., Chicago, Ill.
Meehanite	Meehanite Metal Corp., Pittsburgh, Pa.
Melamine Resins	American Cyanamid Corp., N. Y. C.
Melmac Resins	American Cyanamid Corp., N. Y. C.
Mersblo	Murray Oil Products Co., Phila., Pa.
Metallac	National Oil Products Co., Harrison, N. J.
Methocel	Dow Chemical Co., Midland, Mich.
Methyl Cellosolve	Carbide and Carbon Chem. Corp., N. Y. C.
Micarta	Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Mineral Wool Board	Armstrong Cork Co., Lancaster, Pa.
Mirasolo	Carbogen Chem. Co., Garwood, N. J.
Monostearin	Glyco Products Co., Brooklyn, N. Y.
Mugol	Du Pont, Wilmington, Del.

N

Naftolen	Wilmington Chem. Corp., Wilmington, Del.
Neoprene	Du Pont, Wilmington, Del.
Nevoll	Neville Co., Pittsburgh, Pa.
Nevsoll	Neville Co., Pittsburgh, Pa.
Newport Rosin	Newport Industries, Inc., N. Y. C.
Nipocer	Glyco Products Co., Brooklyn, N. Y.
Nitroparaffins	Commercial Solvents Corp., N. Y. C.
Nopco	National Oil Products Co., Harrison, N. J.
Norbide	Norton Co., Worcester, Mass.
Nucite	Pittsburgh Corning Corp., Pittsburgh, Pa.
Nylon	Du Pont, Wilmington, Del.

O

Onco V	Brown Co., N. Y. C.
Opalwax	Du Pont, Wilmington, Del.

OpaxTitanium Alloy Mfg. Co., N. Y. C.
 Ozlo 414Ozark Smelting & Mining Co., N. Y. C.
 OzowaxGlyco Products Co., Brooklyn, N. Y.

P

ParlonHercules Powder Corp., Wilmington, Del.
 Penchlor CementPennsylvania Salt Mfg. Co., Phila., Pa.
 PentalynHercules Powder Corp., Wilmington, Del.
 PerbunanStanco Distributing Co., N. Y. C.
 PetrexHercules Powder Corp., Wilmington, Del.
 PiccocizerStandard Chem. Co., Akron, Ohio
 Pinene IIIHercules Powder Corp., Wilmington, Del.
 PlastacelleDu Pont, Wilmington, Del.
 Plastic CalkChamberlin Metal Weather Strip Co., Detroit, Mich.
 Plastic Polarizing FilmPolarized Products Co., N. Y. C.
 PlastipitchCoated Products Corp., Verona, Pa.
 PlatelustreMaas & Waldstein Co., Newark, N. J.
 PlexiglasRohm and Haas, Phila., Pa.
 PlexigumRohm and Hass, Phila., Pa.
 PresdwoodMasonite Corp., Chicago, Ill.
 ProsteinGlidden Corp., Cleveland, Ohio
 ProtectoidCelluloid Corp., Newark, N. J.
 PyralinDu Pont, Wilmington, Del.
 Pyrofax GasCarbide and Carbon Chem. Co., N. Y. C.
 PyroflexMaurice A. Knight, Akron, Ohio

R

ResilonU. S. Stoneware Co., Akron, Ohio
 ResinoxMonsanto Chem. Co., St. Louis, Mo.
 ResistoflexResistoflex Corp., Belleville, N. J.
 Rezo WaxGlyco Products Co., Brooklyn, N. Y.
 RhodinolDu Pont, Wilmington, Del.

Rhotex Size Rohm and Haas, Phila., Pa.
Rubatex Rubatex Products, Inc., N. Y. C.

S

Saflex Monsanto Chemical Co., St. Louis, Mo.
Salt Cake Mathieson Alkali Works, N. Y. C.
Santo Wax Monsanto Chemical Co., St. Louis, Mo.
Saran Dow Chemical Co., Midland, Mich.
Seybolite Westport Products Co., Westport, Conn.
Shellacol Commercial Solvents Corp., Terra Haute, Ind.
Silene Pittsburgh Plate Glass Co., Columbia Chem. Division, N. Y. C.
Slatite Maas and Waldstein, N. Y. C.
Sol Lustre E. F. Houghton and Co., Phila., Pa.
Staybelite Resins Hercules Powder Co., Wilmington, Del.
Stroba Wax Glyco Products Co., Brooklyn, N. Y.
Styron Dow Chemical Co., Midland, Mich.
Sublan Glyco Products Co., Brooklyn, N. Y.
Sulfamic Acid Du Pont, Wilmington, Del.
Synprowax Synthetic Products Co., Cleveland, Ohio
Synthetic 100 Moore and Mungen, N. Y. C.

T

Tanoyl National Oil Products Co., Harrison, N. J.
Temlok Armstrong Cork Co., Lancaster, Pa.
Tenite Tennessee Eastman Corp., Kingsport, Tenn.
Tetralin Du Pont, Wilmington, Del.
Thanite Hercules Powder Co., Wilmington, Del.
Theop Glyco Products Co., Brooklyn, N. Y.
Thiokol Thiokol Corp, Trenton, N. J.
Tollac Solvent Neville Co., Pittsburgh, Pa.
Transite Johns-Manville, N. Y. C.
Trigamine Glyco Products Co., Brooklyn, N. Y.

Trigamine StearateGlyco Products Co., Brooklyn, N. Y.
 TurkeleneGlyco Products Co., Brooklyn, N. Y.
 TygonsU. S. Stoneware Co., Akron, Ohio

U

USF-RubberU. S. Rubber Co., N. Y. C.

V

VanaldolFries Bros., N. Y. C.
 Varno SpiritsC. P. Chemical Solvents, Newark, N. J.
 VinsolHercules Powder Co., Wilmington, Del.
 VinyliteCarbide and Carbon Chemical Co., N. Y. C.
 VinylsealCarbide and Carbon Chemical Co., N. Y. C.
 VinyonCarbide and Carbon Chemical Co., N. Y. C.
 VistanexStandard Oil Development Co., Linden, N. J.
 VuePittsburgh Corning Corp., Pittsburgh, Pa.

Y

YamidolGlyco Products Co., Brooklyn, N. Y.

Z

ZelanDu Pont, Wilmington, Del.

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